TECHNOLOGY DEPT.

Gas Journal

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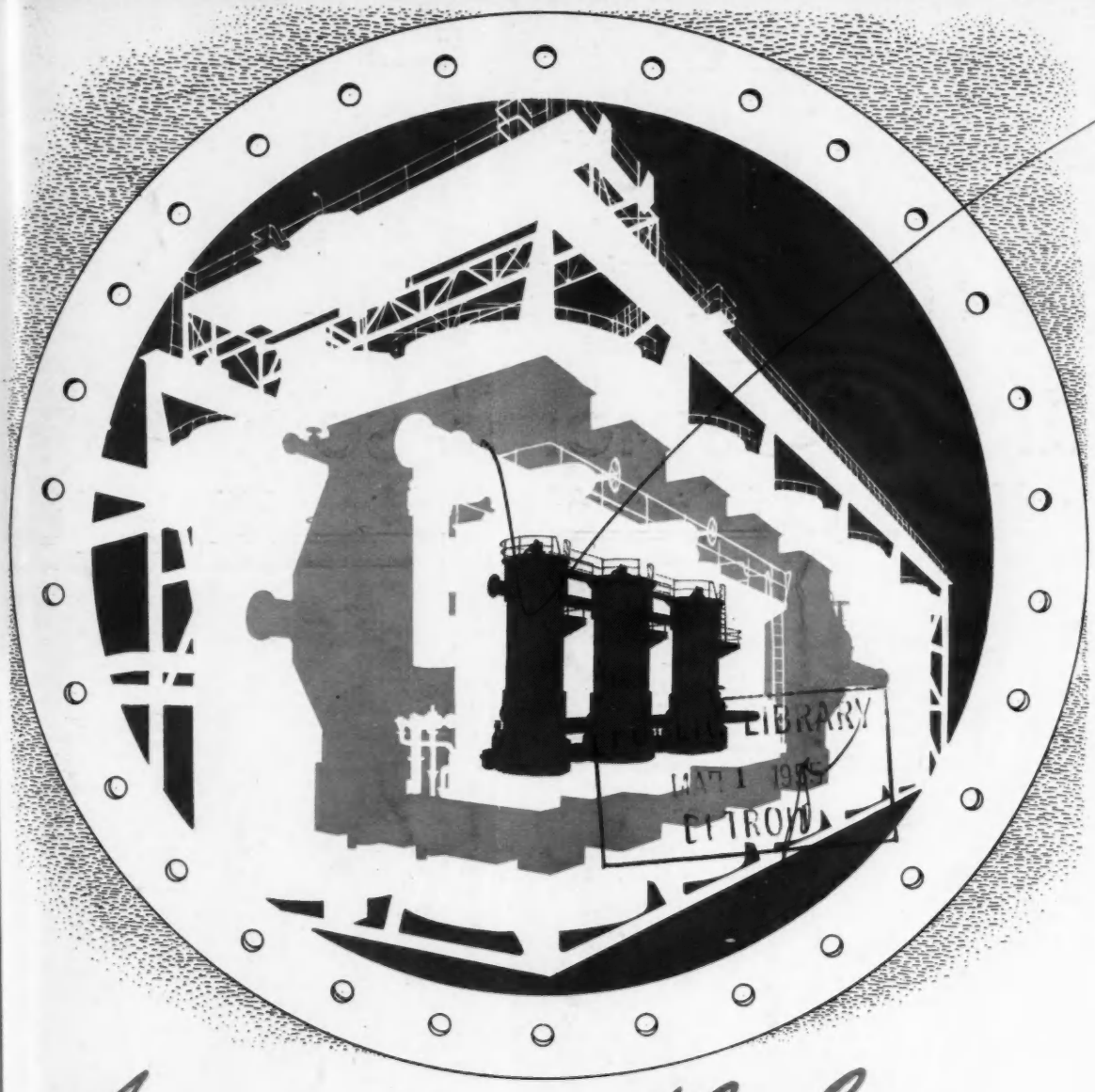

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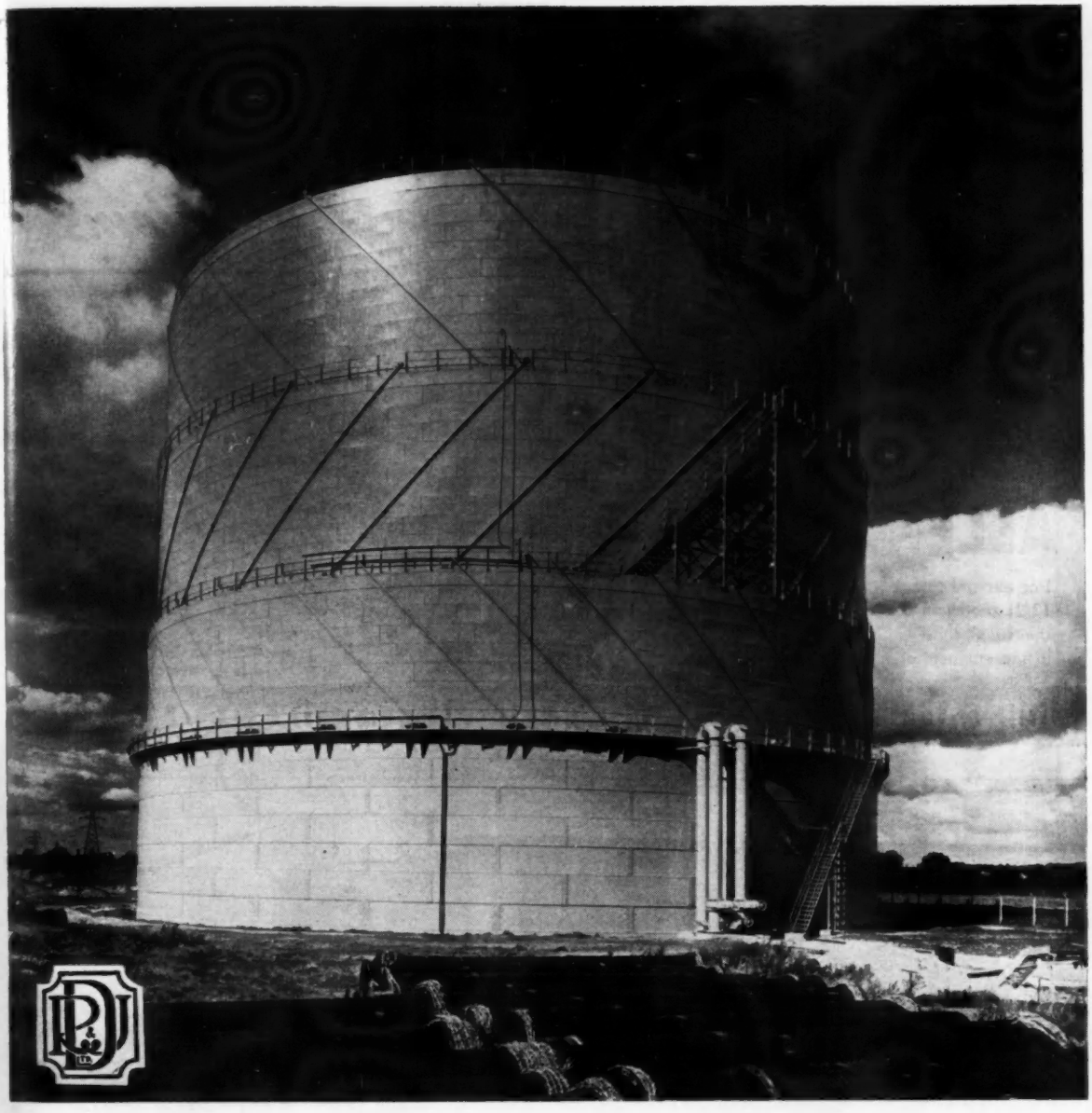

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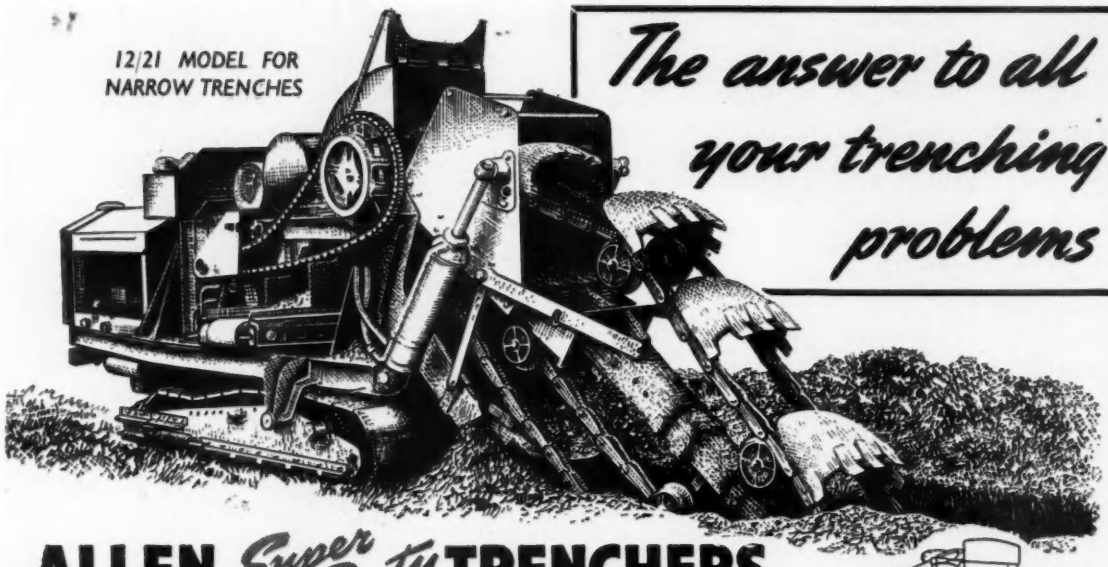

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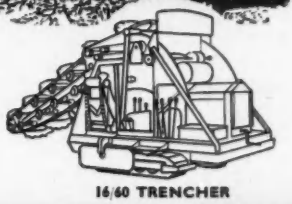

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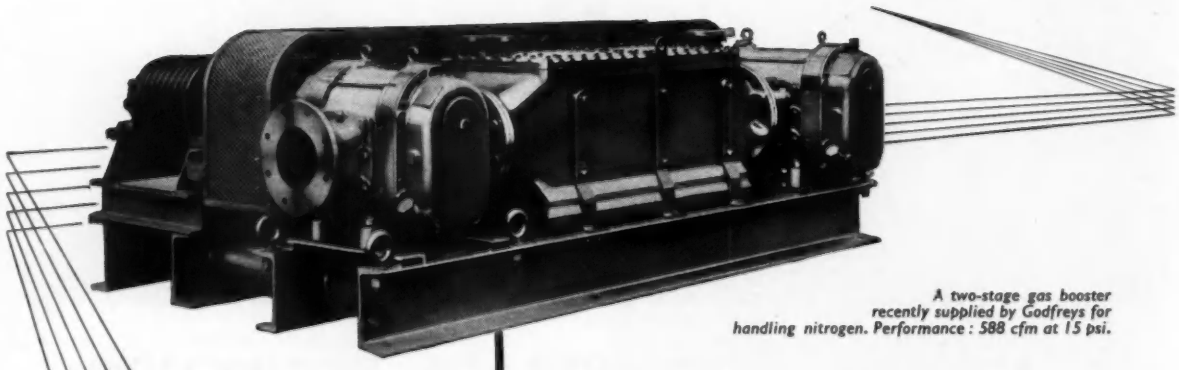

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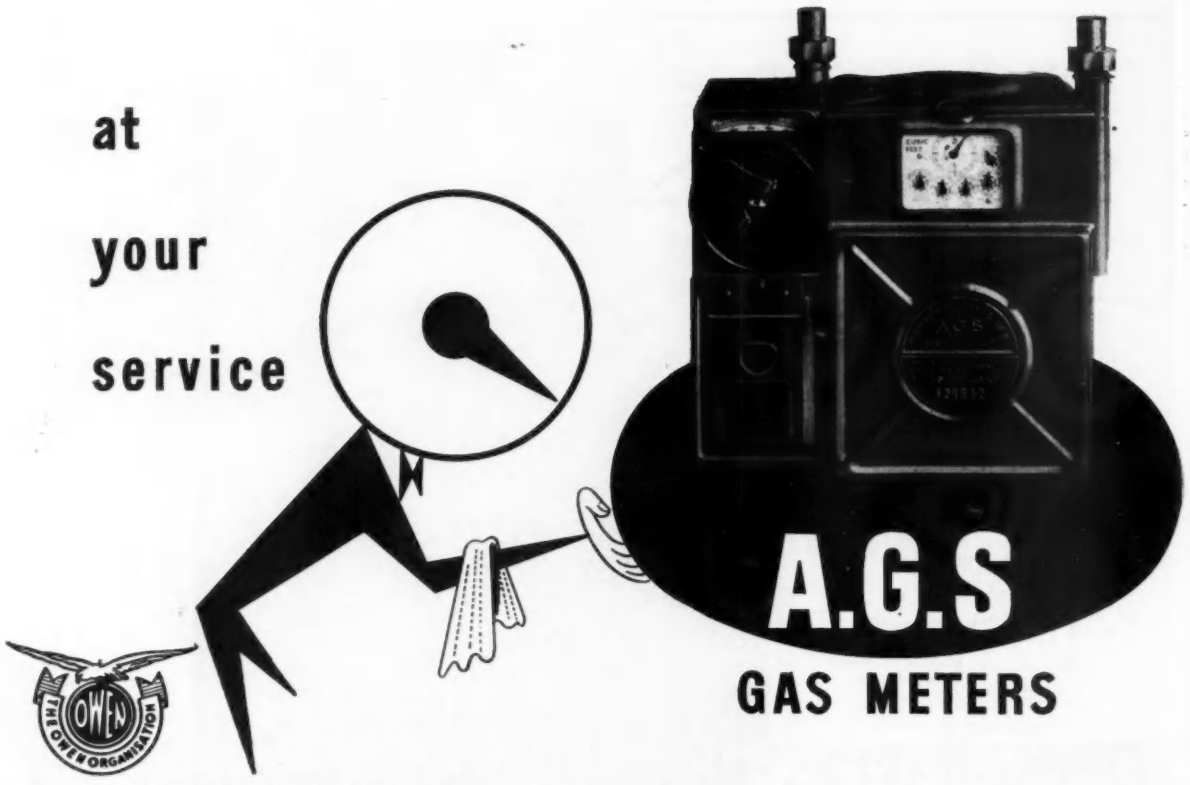

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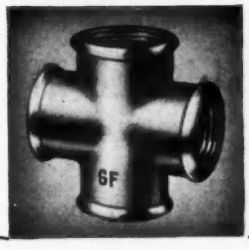

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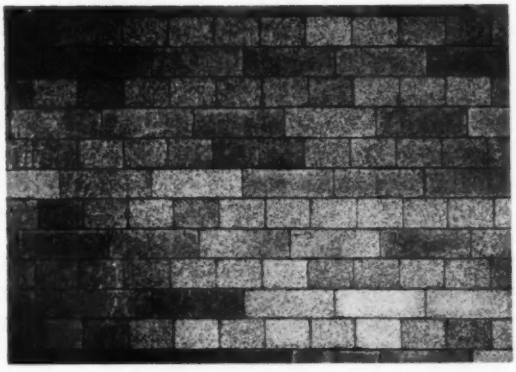

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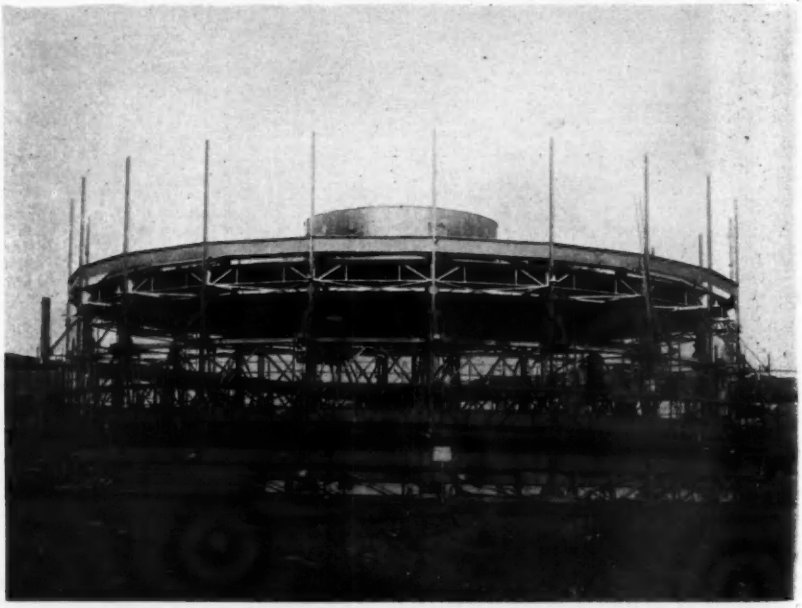

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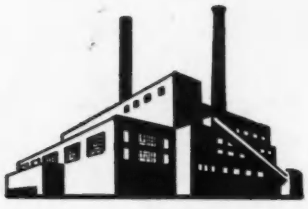

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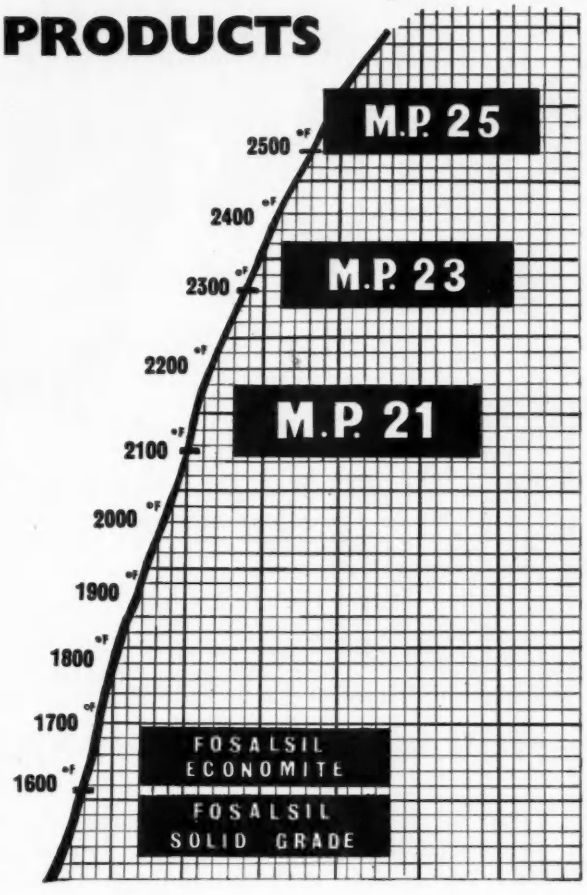

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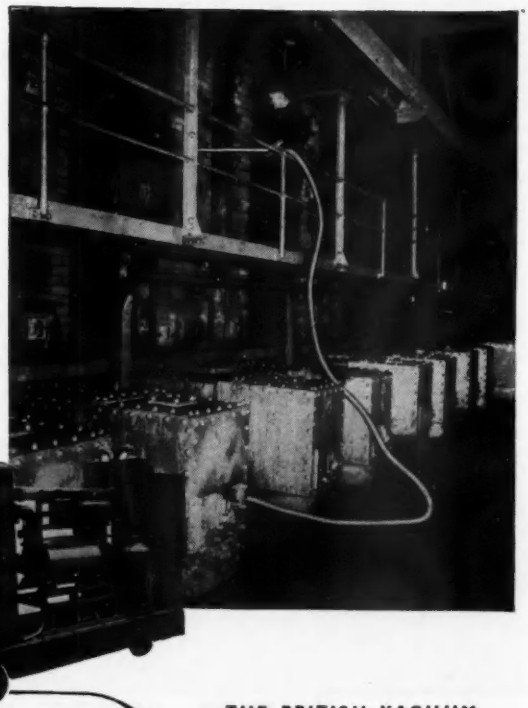

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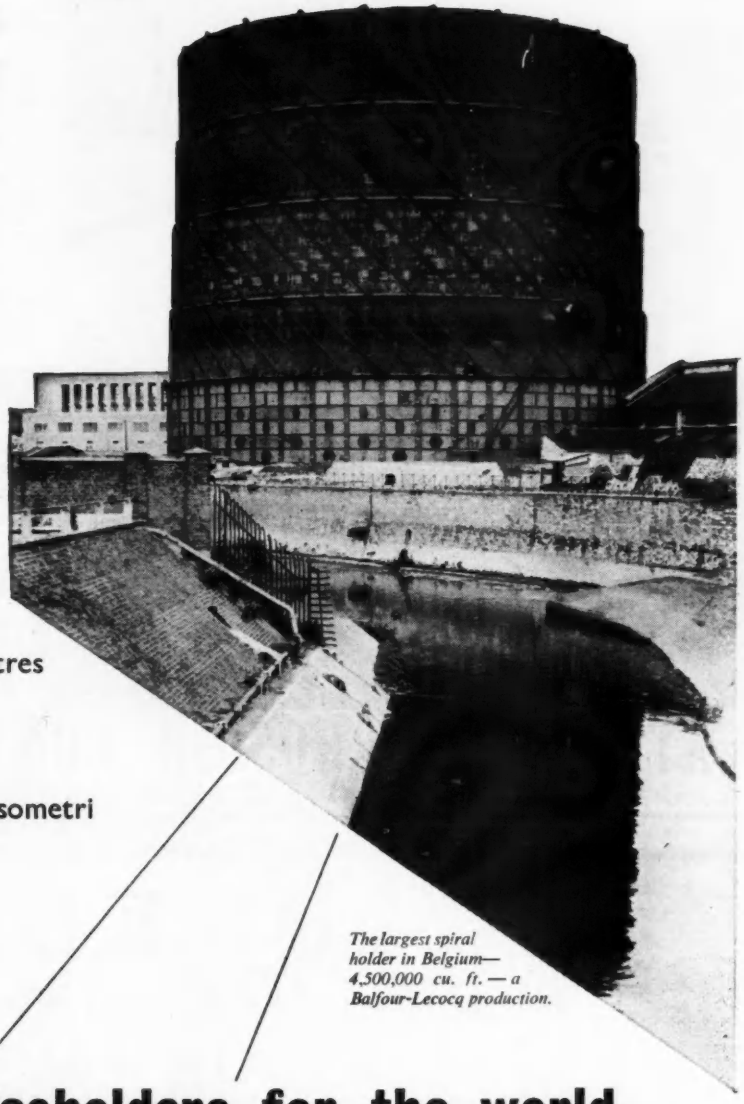

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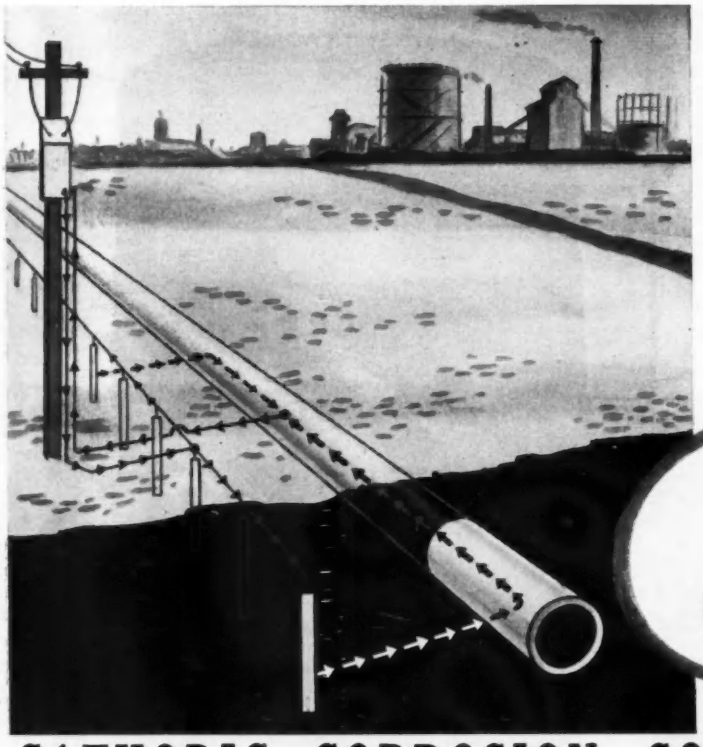

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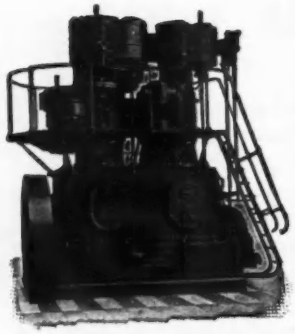

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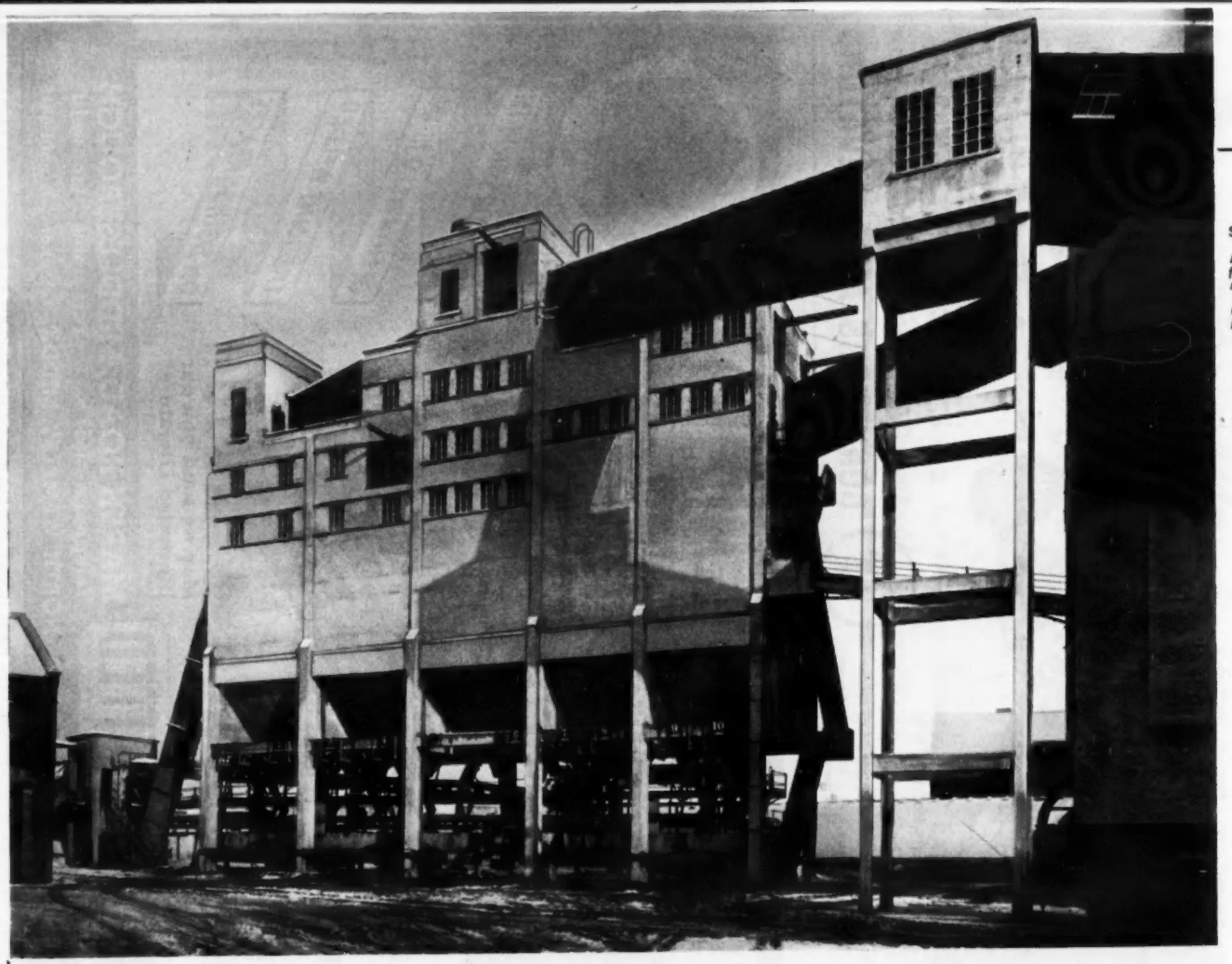

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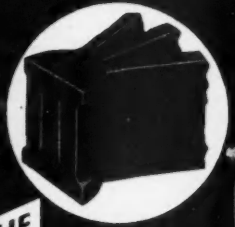

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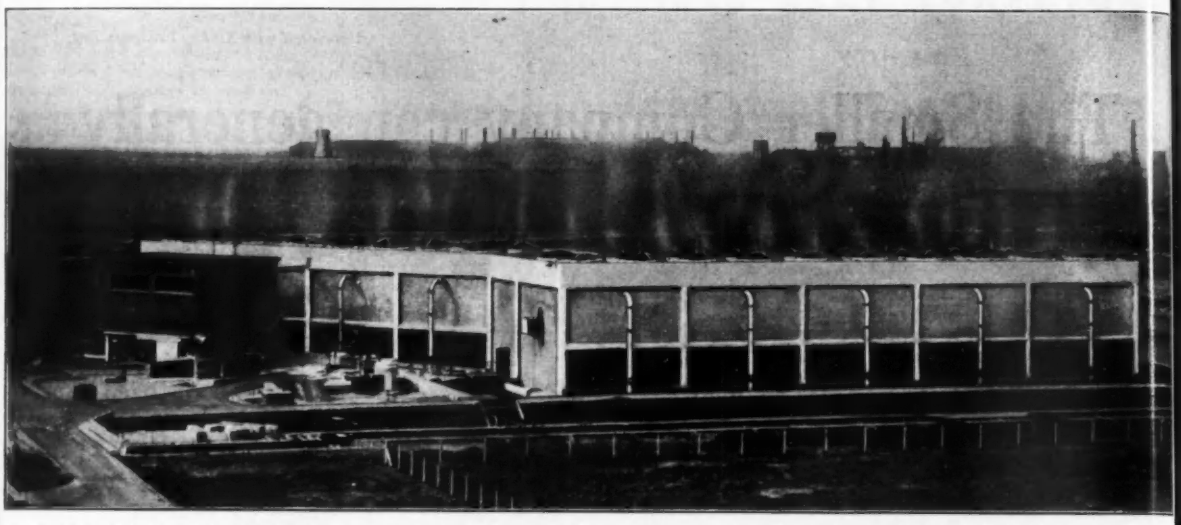

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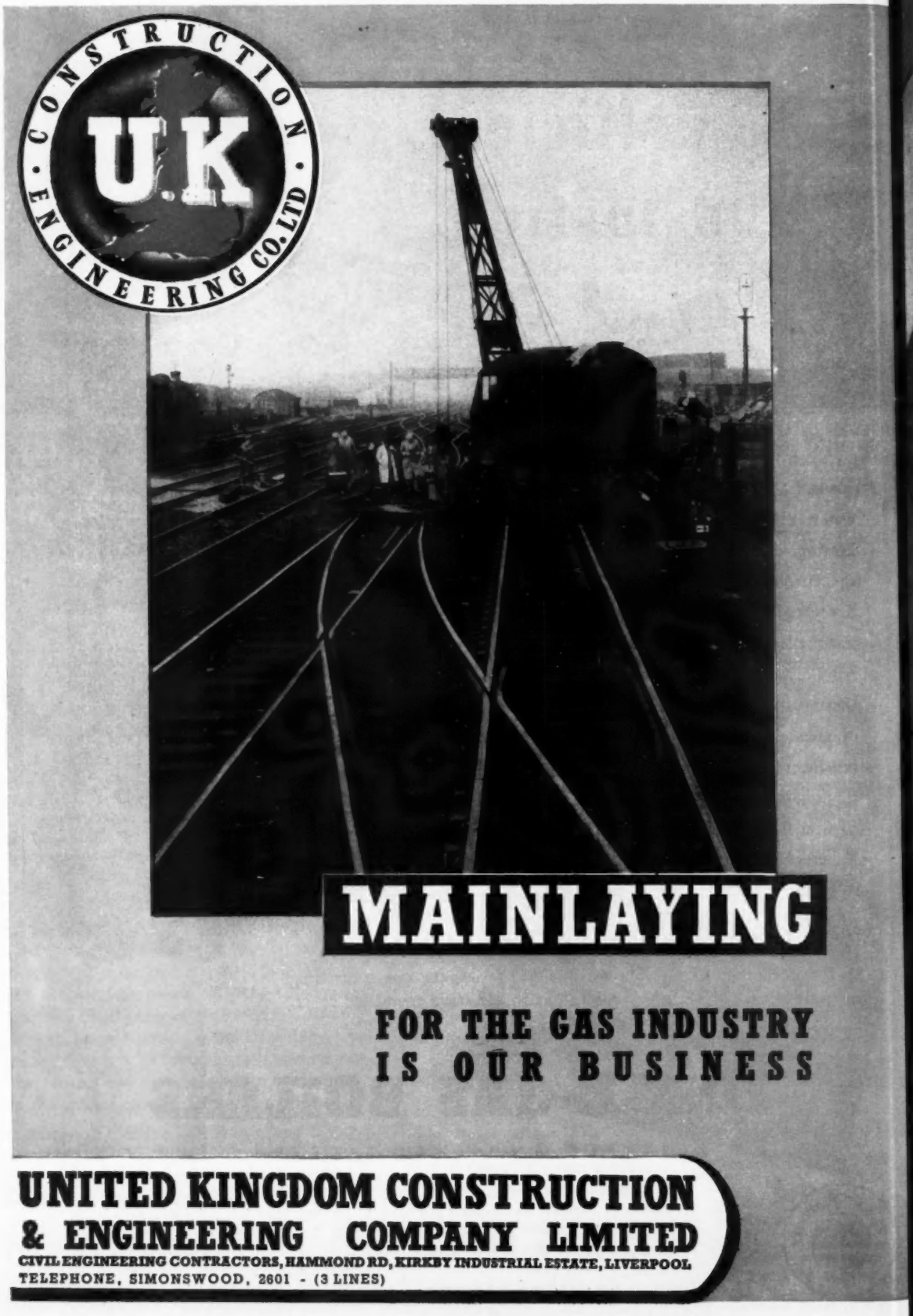
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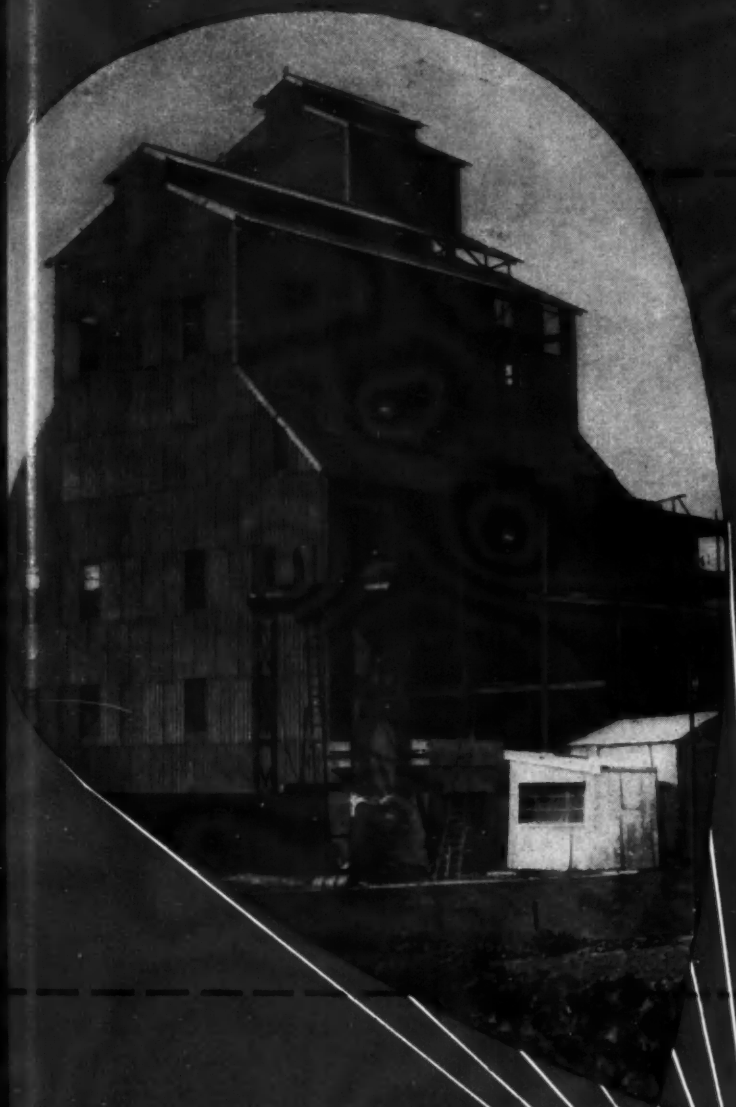

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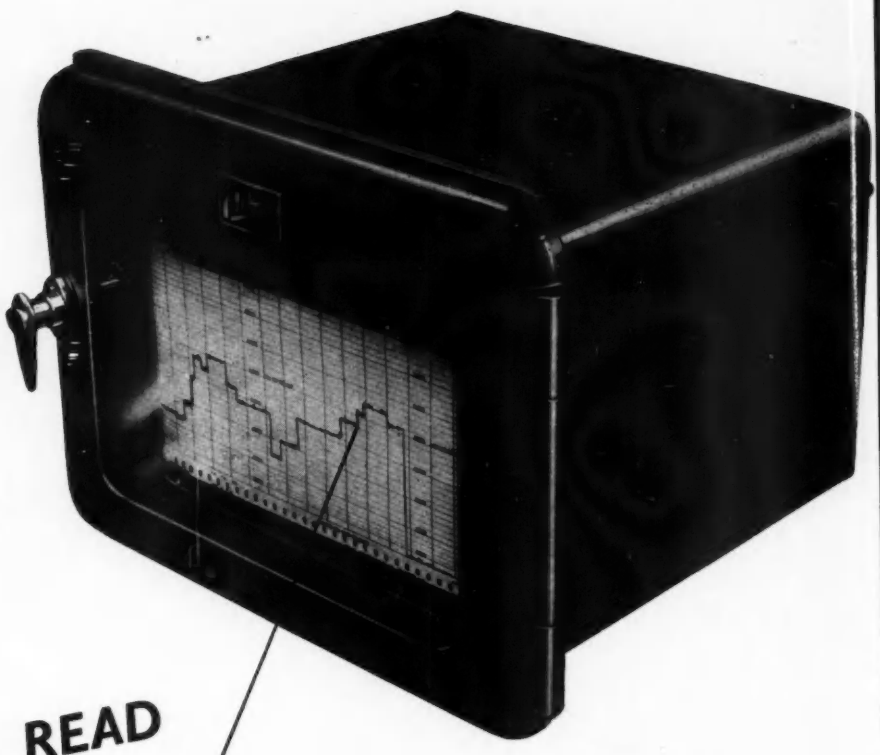

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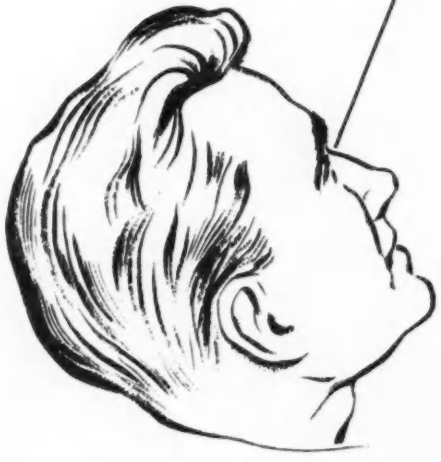

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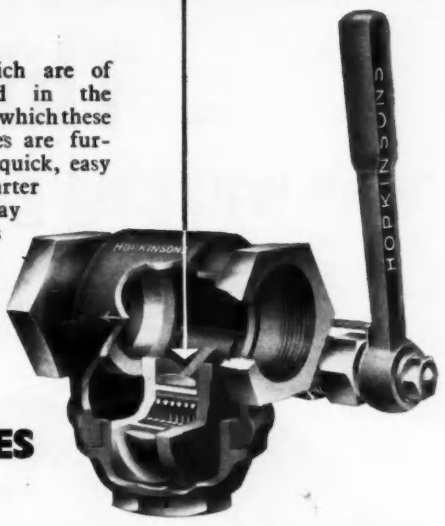

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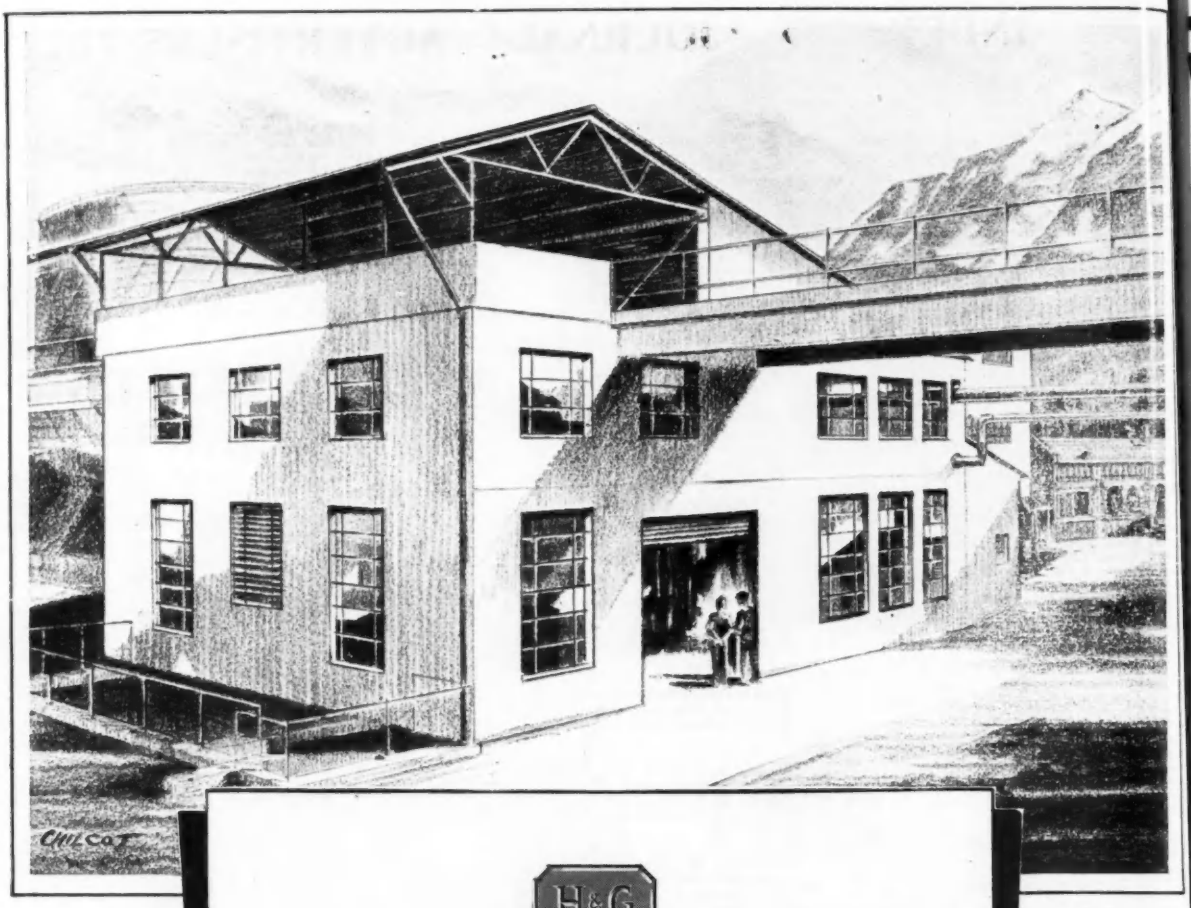

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VOL. 281 NO. 4785 FEBRUARY 16, 1955

107TH YEAR

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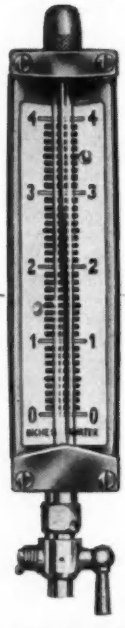

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Gas Journal

VOLUME 281. No. 4785. FEBRUARY 16, 1955. 107th YEAR

Fat and Lean Years

FACED on the one hand with a further increase in its wages bill—a rise of 3d. an hour in the standard rates of pay for 95,000 of its employees agreed by the National Joint Industrial Council on Friday becomes effective on April 3—and on the other by the problem of supplying gas and coke in quantities large enough and at prices low enough to facilitate the implementation of the clean air policy outlined in the Beaver Report (likely to be enforced by Act of Parliament later this year), the area boards still have the duty of so performing their functions that their revenue is not less than their expenditure, taking one year with another. The revenues of the gas industry are not pooled; each board submits its report and accounts directly to the Minister of Fuel and Power, and it is from those reports and accounts that the results of any year's trading are to be judged. In six weeks the industry will have completed its sixth year under nationalisation, and any board which has failed to make ends meet in the past 12 months will be considering ways and means of redressing the balance in the months that lie ahead.

So far as we know, no one has ventured to give a strict interpretation of the expression 'taking one year with another.' The gas industry has not yet been functioning long enough as a nationalised unit to indicate a line of demarcation between 'fat' years and 'lean' years, but it may be recalled that four area boards in the first year and three in the fifth year showed net deficits. Some boards have consistently reported net surpluses, but four have shown net deficits two years in succession; none has yet had a deficit three years running.

The Government's attitude towards the solvency of the nationalised industries in general, and of the railways in particular, was indicated by the Chancellor of the Exchequer in the recent House of Commons debate on the motion welcoming the settlement of the railway wages dispute and expressing belief that the steps proposed by the British Transport Commission would, with the co-operation of all concerned, lead to the establishment of a modern and economic railway system for the benefit both of industry and of the travelling public. Only to a limited extent can it be said that the problems before the gas industry are identical with those of the railways, but they have some things in common—notably a development programme in respect of which the gas industry's borrowing powers have been increased by £200 mill., a duty to render a vital service to the public (industrial, commercial, and domestic) at prices which consumers can afford to pay, the spur of competition from rival industries, and the fundamental responsibility of balancing accounts.

Mr. Butler made it clear that there was no question but that the Government expected all the major nationalised undertakings to carry out the duties laid upon them in regard to 'taking one year with another.' The more the Government's policy developed, he said, the more it would be found that it had been the saviour rather than the destroyer of such sections of our economy as remained nationalised at the present time. That would appear as the various activities of the various nationalised industries came under consideration by the House. He thought it was a very good thing that the Government of the day should be anxious about, care for, and foster the nationalised industries.

The debate followed the settlement of the wages dispute, the rapid implementation by the British Transport Commission of its undertakings, the final report of the Court of Enquiry, the publication by the Commission of its modernization plan, the assumption of their responsibilities by the railway area boards, and the introduction of a new management structure for the whole industry. Expressing confidence that the Transport Commission would take a realistic view of its duty, the Chancellor observed that, making allowances for the obvious differences between a private competitive undertaking and a nationalised undertaking, the remedies were much the same if either found itself facing a loss on current account. Organization and costs must be reviewed so as to increase efficiency, and fares and charges must be adjusted so as to produce the best level of revenue. Looking to the future, solvency must be assured by modernizing plant and equipment.

Mr. Butler went on: 'We have high hopes now that the special joint machinery will succeed in its task of promoting the efficient use of manpower, which is an absolutely vital concomitant of any future success in railway policy. It is vital that we should all work, not only with the Commission, but with the unions in

this matter, because otherwise we are not going to get success, nor follow the path of statesmanship. Given such efficiency emerging from the efficient use of this joint machinery, there can be no incompatibility between railway solvency and the policy of fair wages. If the Commission is to pay its way it must be able, subject to proper safeguards, to raise charges to meet increases in its costs and thus reduce its deficit. It must be able to show that by great efforts towards efficiency it has done all it could to avoid increases in its charges and in its arrears.'

The Government believes that there is no substitute for competition as a spur to efficiency. Indeed, competition and decentralization were, and are, the two themes running through the Transport Act of 1953, which to that extent resembles the Gas Act of 1948—a measure which went much further than any of the earlier nationalisation Acts in regard to regionalisation. The Gas Council believes that the first five years showed that the regional structure of the gas industry is well suited to its particular requirements and conducive to the best service to consumers.

A Gas Industry Distinction

TO Miss Marjorie Lovell Burgess, Lectures Officer of the Gas Council, goes the distinction of being the first woman since 1930 to be awarded a Premium by the Society of Engineers. The presentation took place at the Society's headquarters on February 7. Does this gesture mean that her lecture on William Murdoch, delivered to the Society last October, places her in the same class of notability as the famous airwoman, Amy Johnson, who was the last woman recipient of the award? Perhaps that would be saying too much, and in any case here are two women with different objectives. But there is a lot they have in common. Both have grasped fundamentals of engineering fields normally the prerogative of men. Both have exhibited tenacious qualities in making manifest their abilities. And both have shown extraordinary energy and endeavour. Previously an industrial journalist, Miss Lovell Burgess now averages 200 lectures a year on behalf of the Gas Council and is the author of three novels and a handbook on her private *forte*—amateur cinema photography.

We think what influenced the Society of Engineers to bestow this honour was its delight at her awareness of Murdoch's historical significance and of his kinship with the modern gas engineer. It must also have been impressed by the literary polish which enabled her to paint such a vivid picture of a real man. Most engineering papers are blessed with neither polish nor with vividness, largely—lest it be said that we are being hypercritical—because the subject matter does not demand it. Another factor which probably appealed to the selectors was the sheer novelty of a woman convincing a learned body of engineers of Murdoch's undying place in the world; a man who lived in an age when 'women in industry' just did not exist.

For the lecture itself, we might well leave it to the President of the Society to sum it up. He said, in the discussion that followed Miss Lovell Burgess's reading of the paper, that they had heard an 'intellectual treat' and continued: 'We have had a historical survey, a fine review of recent engineering practice and a forecast of the future.' Miss Lovell Burgess traced the progress of the gas industry up to the present day, and spoke of the effects of nationalisation; she also gave her views on the position 50 years hence. What she thinks that position will be was described in the last paragraph of the Premium-winning lecture: 'One thing it is safe to say,' she said, 'that in the year 2004 A.D., the keystone of efficient communities all over the world will be the fuel and power industries, and prominent among them will be the highly mechanized modern gas industry with highly skilled gas engineers, men of integrity, worthy successors of William Murdoch.'

Just so long as we have men and women as capable as Miss Lovell Burgess of acting as spokesmen for the talents of gas engineers, their great traditions will always thrive.

BRITISH GAS EQUIPMENT FOR CANADA

REFERENCE was made in a recent issue of the 'JOURNAL' to a proposed scheme for exporting British gas equipment to Canada in the hope of gaining a foothold in the rapidly expanding natural gas market. The discovery of new sources of natural gas in Alberta and British Columbia, and the possibility of finding further supplies in Saskatchewan, Manitoba, and the North West territories has excited the interest of American and German firms, and it is believed in some quarters that there may be a useful market for British products. A preliminary move has been the formation of British Canadian Gas Services, Ltd., a group of member-firms taking collective action to promote British gas equipment in the Canadian market. The matter has now been taken a stage further by the evolution of a plan based on general conclusions reached at the initial meeting on December 15 and upon representations from various interested parties since that date.

It has been agreed that the initial period should be three years, and since time is now the essence of the plan it is hoped that by the middle of March the basic financial arrangements will have been made. The whole scheme is expected to be underwritten by the Export Credits Guarantees Department. By the end of March it is anticipated that the first steps towards sales in Canada can be made. These will consist of a visit by two technicians and Major J. N. Watson, who has devised the entire project, to study with the licensing authorities in Canada the suitability of the items which it is proposed to sell. Such items as do not need this licence, or have already secured it, may be the subject of an immediate sales survey by Major Watson. The technicians would be absorbed into the staff in Canada, or if they wished to come home, replaced by colleagues from the United Kingdom or by Canadians, as considered most suitable. The rest of the necessary sales force would be assembled so that an energetic sales programme could be instituted by June. Although this plan is based upon Ontario in the first instance, preparations would be made for an extension to Winnipeg, Edmonton, Vancouver, and Montreal.

There would certainly be no lack of difficulties to be overcome, particularly in the field of gas appliances, as opposed to valves, governors, industrial equipment, etc. Price maintenance was eliminated four years ago, resulting in discount houses offering goods at slashed prices and relying on high turnover to keep in business. Certain

British appliances, notably cookers, are as far removed from Canadian styles as are our cars. There are also Canadian Gas Association tests to be passed, although it is possible that arrangements will be made for these tests to be carried out at Watson House. Added to all that are the problems of selling in a vast, sparsely populated country with—initially at any rate—a slender sales organization.

But these obstacles need not be insurmountable and, although they are peculiar to Canada, they are no more formidable than difficulties encountered in other countries in which British goods have been marketed with success. Progress must mean expansion, and for this reason alone the future of British Canadian Gas Services, Ltd., will be watched with sympathetic interest. The secret, we believe, is one of attitude. The Canadians will treat a 'take it or leave it' approach with the contempt it deserves, but it may well be that an approach made in a spirit of genuine co-operation and anxiety to please will not go unrewarded.

Some comments have been made that the plan would prove too costly. But it must be remembered that various schemes have been tried by individual companies, such as sending two or three technicians to work in a back room attempting to introduce a small quantity of appliances such as cookers and water heaters. This method is not suited to Canadian ideas of salesmanship.

Canada is a country where the meek do *not* inherit the earth and any sign of timidity in a salesman is at once interpreted as a lack of confidence in the quality of the goods he is trying to sell. It would appear that the group idea is the most promising line of approach, but it must be backed by sufficient funds if only for the sake of national prestige. It must not be forgotten that our chief competitors are the Americans whose purse strings are always loose when commercial rivalry is at stake.

YORKSHIRE'S INDUSTRIAL LOAD

BEARING in mind the emphasis on the industrial gas load and the challenge of coke at the recent biennial staff conference of the North Eastern Gas Board it is not surprising to find that these two aspects of the gas industry's contribution to public utility are chosen for special mention by Mr. G. E. Currier, Deputy Chairman of the North Eastern Board and a past President of the Institution of Gas Engineers, in an article in the commendably well produced 100 pp. *Yorkshire Post Trade Review*. Referring to the gas industry's quest for alternative sources of gas, Mr. Currier says it does not lose sight of the fact that the greater use made of sources other than coal will reduce the production of coke which, with the nation becoming more health-conscious, is in increasing demand. The industry is investing in plant to provide the consumer with gas coke of the type and size required by each. The modern screening plants at Bradford, Tingley, Scarborough, and Harrogate, are examples, and more are under construction at other large gasworks. Mr. Currier rightly draws attention to the technical advisory services now available, and to the development work carried out by the Gas Council on new boiler design and the coke-fired semi-producer furnace which has been used successfully for drying grass, grain, flock, cotton, fertilizers, chalk, limestone, and concrete.

Latest statistics of the North Eastern Board show that the industrial and commercial gas load has reached 40.11% of the total sold, and Mr. Currier includes in his review a selection from the 4,000 different heat processes employing clean, controllable, labour-saving gas. One of the chief fruits of nationalisation has been the co-ordination of the activities of numerous independent gas undertakings, so that a uniform technical advisory and maintenance service is available to all industrialists irrespective of the location of their premises. What the North Eastern Gas Board has achieved and is aiming at is matched to a greater or lesser extent by all the other 11 boards, and in both the spheres which we have selected for mention, Gas Industry House is, to a greater extent than was possible before vesting day, serving as a clearing house for the accumulated experience, research, and advice of the experts in all the 12 areas.

GAS AND FUEL EFFICIENCY

ON February 2 Mr. W. L. Howe, Industrial Gas Engineer, Liverpool Group, North Western Area Gas Board, addressed the North Western Fuel Luncheon Club meeting at the Engineers' Club, Manchester, on 'The Fuel Efficiency Service of the Gas Industry.' He said that the field of operation of the industrial gas engineer was very wide. The industrial gas engineer was required to be Jack of all trades but master of one—that of efficient fuel utilization. He must master the technique of the processes to which he sought to apply the use of gas—even be able to talk in the jargon of the trades with which he was dealing.

Mr. Howe claimed that the gas industry was first in this country to set up a fuel efficiency organization. He related the history of the evolution of the system of industrial gas development centres culminating in the Industrial Gas Development Committee of the Gas Council and the Information Bureau. He outlined the main functions of the Committee and described the facilities which were at the disposal of prospective users of town gas in industrial processes. He gave several telling instances of the successful application of gas in the industrial and commercial fields and he described, in particular, the structure of industrial gas service in the North Western area.

Research and experimentation, he assured his hearers, were constantly going on in the industrial gas centres and in the laboratories of the Gas Council's Research Stations. 'Improvements in combustion techniques are constantly being developed and it is safe to say that some industries now depend almost entirely upon combustion processes originally developed in the laboratories of the gas industry.' He gratefully acknowledged the co-operation in this work of manufacturers of furnaces and combustion equipment. 'The gas industry is not only concerned to increase the use of gas in industry but also to see that what is used is used efficiently.' Industrialists would be well advised to consult their local gas undertakings before installing some of the so-called 'fuel saving equipment' based on specious promises of 'guaranteed savings.'

Those of Mr. Howe's colleagues who heard this address to a mixed audience of fuel technologists and industrialists were agreed that he presented in a most effective manner an impressive picture of the gas industry's achievements in the field of fuel efficiency.

Despite a seasonal fall of 100,000 in December, the number of workers employed in the United Kingdom at the end of 1954, at 22,700,000, was higher than in any previous year, being 350,000 greater than in December, 1953. During 1954 the manufacturing industries gained 260,000 new workers, 180,000 of these entering the engineering, metals, and vehicle manufacturing group. The number of workers out of work at the middle of January this year represented 1.4% of the total working population, against 1.8% a year ago. Of the 298,000 unemployed at mid-January, about 100,000 had been out of work for more than eight weeks. There is still an acute labour shortage in most parts of the United Kingdom. The latest figures show that in October last year for every unemployed worker there were one and a half jobs.

Correspondence

COKE EXPERIMENTS IN 1930

DEAR SIR,—I was very interested in reading in your issue of February 9 Dr. Lessing's reminder of experiments on the carbonization of cleaned coal with which he and I were associated in 1930.

Dr. Lessing was probably speaking from memory, and I am only writing to correct a comment which he makes on the use of coke in water gas manufacture. He says 'clinkering was necessary every eight hours against every two hours previously.' The fact was that with the clean fuel the generator fire was not clinkered for 48 hours against a normal period of once every eight hours. With coke of the quality used in the experiments a normal clinkering period in practice would have been once every 24 hours instead of once every eight hours, the output of the carburetted water gas plant being increased by at least 20%.

Yours faithfully,
HAROLD SMITH.
1, Grosvenor Place,
London, S.W.1.
February 11, 1955.

GAS DISTRIBUTION NETWORK ANALYZER

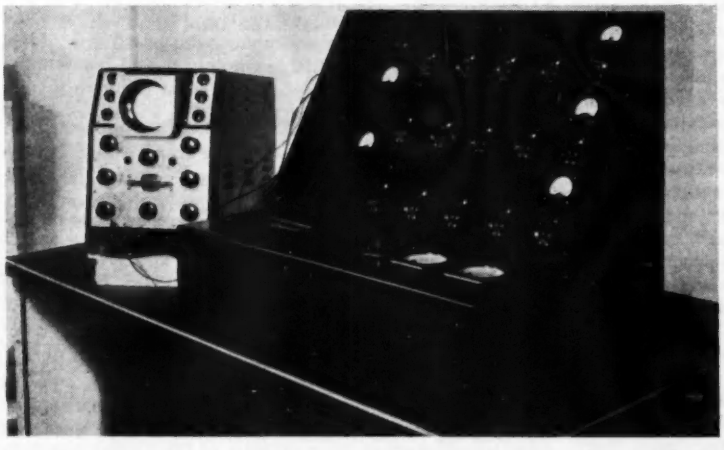
DEAR SIR,—I read with interest your account of the gas distribution network calculator in the 'Trade News' section of your January 26 issue. You may be interested to know that a small network analyzer has been built up for experimental purposes by the West Midlands Gas Board, and I enclose herewith a photograph of the instrument in question.

The unit simulates three gas generating stations, nine interconnector units and three compressor stations; compressor levels are indicated on direct reading instruments; also gas flow and pressure drop. The principle is very similar to the instrument which you describe but its operation is thought to be somewhat different in that instead of adjusting all the elements continuously, according to a given mathematical series, a cathode ray tube is used for visible indication of balance which can be seen on a screen, the calibration of which can be made suitable for any pressure/volume relationship.

I would add that there are many electrical network analyzers in use throughout the country; in particular our small set-up was given a preliminary test by Messrs. Reyrolle, of Hebburn-on-Tyne, who are well known switchgear manufacturers and who possess both an A.C. and D.C. network analyzer of considerable magnitude. The method which we have adopted to indicate balance was given by the American Institute of Electrical Engineers about two years ago.

In all methods of applying the electrical analogue to a gas distribution problem there is the question of compressability; at the moment this does not appear to have been solved although there also does not appear to be any reason why this method should not be further developed in this direction.

Yours faithfully,
G. M. RIMMER.
Electrical and Mechanical Engineer.
West Midlands Gas Board.
January 31, 1955.



A small network analyzer built for experimental purposes by the West Midlands Gas Board.

Personal Notes

MR. LESLIE H. HARDERN, Public Relations Officer of the North Thames Gas Board, has been admitted to the Freedom of the City of London.

MR. F. HARVEY, Deputy Divisional Manager of the Walsall and District Division of the West Midlands Gas Board, has been appointed Divisional General Manager there in succession to Mr. E. Hardiker, whose retirement was announced in the 'JOURNAL' last week.

MR. H. L. SATCHELL, a Director since 1949, has been appointed Deputy Director of Manufacture of the British Thomson-Houston Co., Ltd. MR. H. E. COX, Manager of the Company's Willesden works since 1946, will succeed Mr. Satchell as Manager of B.T.H. Rugby works on March 1.

MR. V. C. MILES, who has acted as Midlands Area Manager of the Teddington Group of Companies since 1948, is returning to the Sunbury Works to take up the appointment of Assistant Sales Manager for the British Thermostat Co., Ltd. His position in the Midlands has been filled by the appointment of MR. L. E. NICHOLLS, who has assisted him there for the past 12 months.

MR. O. D. GWILLIAM, A.R.T.C.S., A.M.I.MECH. E., has been appointed Works Manager for W. C. Holmes & Co., Ltd.

SIR EWART SMITH has been appointed a Deputy Chairman of Imperial Chemical Industries, Ltd. The Company has two other Deputy Chairmen—Mr. A. J. Quig and Mr. S. P. Chambers. Sir Ewart joined Synthetic Ammonia and Nitrates (the forerunner of I.C.I.'s Billingham Division) in 1923 and for 19 years served at Billingham in various engineering and managerial posts. In 1932 he was appointed Chief Engineer of the Billingham Division. He was appointed to the Board of I.C.I. in 1945, becoming Technical Director in 1946 and was knighted in that year. Sir Ewart is Chairman of the British Productivity Council.

Obituary

MR. JOHN MOWAT, F.S.A. (SCOT.), who prior to his retirement several years ago spent most of his business life with Archibald H. Hamilton and Co., Ltd., paint manufacturers, Glasgow, as Works Manager, Travelling Representative, and latterly as Director, died on January 30, aged 86. He was well known to many of the older generation of gas engineers, particularly in Scotland.

Architects' Information Sheets, diagrams, and photographs of gas and coke fires showing particularly how the flues may affect the building structure were displayed at the Architectural Association School at Bedford Square. They were part of an exhibition showing details of building services of all descriptions which had been prepared to assist students at the school in their studies of these services. The provision of such material is indicative of efforts being made by the architectural profession and by the gas industry to keep students fully informed of the latest technical information.

Functions of a Coal Test Works*

By G. E. BROOKE,

Superintendent, Central Test Works, West Midlands Gas Board

THE City of Birmingham Gas Department was authorized by the Gas Committee in 1904 to build a full scale test works, to be under the control of a qualified scientist, who was also to be provided with a suitable laboratory. So the central laboratories and coal test works came into being in 1905, and thus celebrate their Jubilee jointly with the Midland Junior Gas Association. Today the central test works is one branch of the area laboratories, which serve the West Midlands Gas Board as a whole. Other branches of the laboratories are also engaged in the sampling and testing of coal. In particular, the fuel section looks after such things as the final reduction and preparation of samples, the testing of coke, the keeping of statistical control charts and the working of the small-scale coal assay plant (Cronite retort), while the chemical laboratory does all the analytical work required on coal, coke, tar, and gas.

The present test works was largely redesigned and rebuilt shortly before the war, and now consists of four Woodall-Duckham lambently-heated vertical retorts, any one of which may be used as a test unit, and two sets of ancillary plant, each consisting of retort house governor, condenser, exhauster, Livesey washer and station meter, together with collecting and measuring vessels for tar and liquor. These streams are quite independent and enable two simultaneous tests to be carried out. All gas made is finally passed into the mains of the Nechells gasworks, which also deals with the tar, liquor, and coke produced. Coal and coke handling plant, sampling equipment, crushers, grinders, drying ovens, and all measuring and testing facilities are available.

For many years the horizontal retort was used as the medium for assessing the quality of a coal; the thermal yield of straight coal gas obtained (the so called 'horizontal multiple') being used as a basis for comparing the relative efficiencies of the Birmingham works. This was superseded by the introduction of the small scale test plant (the Cronite retort) which was described by Mr. B. H. Cunningworth in a paper to the Institution of Gas Engineers in 1951. (I.G.E. Communication No. 384.)

This plant is reliable and gives speedy and reproducible results, which agree very well with the large scale horizontal retort tests. Results from this plant are now used as standards for evaluating coals and for correlating the results of various works, and which are referred to in this paper as 'Cronite results.'

The test works has three main functions: The regular systematic sampling of all the coals received by the West Midlands Gas Board; full scale testing on the continuous vertical retorts; and special investigations.

Coal Sampling

Coal sampling, to be effective, must be carried out to a plan, which is worked out between the test works, the fuel section and the coal and transport officer. The number of wagons of each variety of coal sampled should be related to the known (or suspected) variability of the coal and the quantity of that coal being received by the Board. To get a true statistical picture of all coals, it would be necessary to sample some 3,000 wagons per year. At present we are sampling at the rate of about 1,500 wagons per year, and in addition some 500 tests are being reported from laboratories at other works in the area. Each wagon unloaded is sampled by mechanical means, and tested for moisture, ash, volatile matter, and calorific value.

If required for Cronite testing, samples are reserved, and when at least three such samples have been collected these are mixed together, the Cronite test is carried out on the mixture and an average sample undergoes 'full-prox' analysis. If required for full scale test, the coal remains in one of the test bunkers; otherwise it is reloaded into wagons and carbonized at Nechells works. Only about one-third of the coal unloaded is actually carbonized on the test works.

Test results are of little use unless they are made known as widely as possible. The 'Blue Book' (Assays and Ash and Moisture Content of Coals) is a comparatively recent addition, and has been in existence for rather more than a year. About 45 works in the area receive copies, and it contains an alphabetical list of all coals likely to be received, split up into the four National Coal Board Divisions from which coal is obtained. It shows the Cronite multiple for the coal, with the moisture and ash content relating to that multiple, the date of the test, and the swelling number of the coal. This information is revised annually. The book is provided with stiff cardboard leaves to which gummed slips issued by the laboratory each month can be affixed. These show weekly averages of moisture and ash content of tested coals, and a progressive average from the commencement of the year.

About 80 copies of the 'Cronite multiple' sheet are circulated, giving the latest Cronite test results, the swelling number, and the moisture, ash, sulphur, and total chloride contents of the coal. The coal and tar yields are given, and also the names of the coal seams mined at each colliery. Additions and amendments are made as soon as new information becomes available, usually at approximately monthly intervals.

A card index is held by each Divisional General Manager, the Chief Engineer, and the Coal and Transport Officer. It gives summaries of all Cronite and full scale tests carried out since 1948, and is kept up-to-date either by the issue of new cards or by additions to existing ones as soon as possible.

Full-scale Testing

Full scale testing of coals reproduces as closely as possible the conditions liable to be met with in actual works practice. A normal standard test has been evolved through the years, and every coal examined now goes through this test in the first instance. Usually this is sufficient to yield all the information required, but it is sometimes desirable to re-test under different conditions. The standard conditions are:—

Throughput.—One ton per day per 10 in. major axis of retort—*i.e.*, on the central test works, 6.2 tons per day.

Steam.—10% by weight of coal carbonized.

Retort temperatures.—1,360°C. to 1,370°C. in the hottest section of the combustion flues, with 1,060°C. to 1,070°C. at the waste gas dampers.

Level gauge conditions at the retort offtake.

These conditions vary slightly during a test period; throughput is difficult to control exactly, but as the coal is weighed into the retort hourly, adjustments can easily be made to keep within reasonable limits. Over the period of a test (never less than three days) the throughput should be within the range 6.1 to 6.3 tons per day.

Steam is closely controlled. Each retort has its own reducing valve and pressure gauge. The steam nozzles are cleaned and checked for size at the beginning of each test, and no water sprays are used for coke quenching. Hence the amount of steam passing the nozzles is the actual amount admitted to the retort, no extra steam being derived from evaporated water. This apparently low percentage of steam usually proves sufficient to quench the coke and to bring the calorific value of the gas within the required range. Steaming on the test works always seems to be much more effective than on the large works, and the only explanation one can offer is that the nozzles *are* clean and that the pressure is read *immediately* behind the nozzle. In other words, the desired 10% of steam gets into the retort.

Retort temperatures are moderate, and can be controlled to within about 50°C. of the desired figures. The settings are

* From a paper presented to the Midland Junior Gas Association on February 8, 1955.

fired by town gas, each side of each retort having its own meter, so that fuel consumptions can be obtained with accuracy, and adjustments to the setting heats can be made with some confidence. Flue dust is absent, and dampers do not stick. It is a shock to find, however, that to make a therm of gas in a retort something of the order of 0.4 therm is consumed in the setting. Offtake pressures are controlled by an Askania governor, and a recorder is fitted to the retort. Offtake temperatures are also recorded, and prove a valuable guide to the stickiness or otherwise of the charge. The lower swelling coals usually give a very steady line, in the region of 70°C. to 100°C., while the very highly swelling ones are much more erratic, and may reach 300°C. or even higher. Bottom pressures are regarded as important and these, too, vary considerably with the type of coal, ranging from a steady 0.2 in. w.g. vacuum with an easy travelling coal to an erratic 0.3 in. or so of pressure with some of the more difficult ones.

Routine Precautions

The retort house coal bunkers are small, little more than chutes, which can easily be levelled off hourly. The error due to hopper stocks is unlikely to be more than 28 lb. on a coal carbonized figure of 18 tons or more. The scales are modern, and maintained by the makers, and are frequently checked for accuracy. It is a little disturbing to find how frequently scales do err from one cause or another. Owing to the absence of water sprays, the coke is discharged substantially dry, but it is tested twice daily for moisture content and volatile matter, both of which are usually of the order of 1% or lower. This dryness is advantageous, as hot, wet, run of retort coke is notoriously difficult to sample for moisture content.

Positive meters are employed, regularly tested by the meter and stove department, and by occasionally running two meters in series with each other. The gas is metered in the crude state, so in addition to the usual corrections for temperature, barometric pressure, meter pressure, and meter error, allowance has to be made for the H_2S content of the gas. Only the small amount of gas required for test purposes is purified from H_2S, and no air is admitted for revivification of the oxide.

Calorific Value and Gas Analyses

A 100 cu.ft. sample of gas is collected over 24 hours, and is tested on duplicate certified 'Boys' calorimeters. A 'Thomas' recording calorimeter is installed to give a continuous record of calorific value, which is not nearly so steady as one would imagine. For this reason, to guard against possible errors due to irregularity of sample-holder collection, the following procedure is now adopted. The collected sample is switched on to the 'Thomas' recorder, which then gives a steady line which can be compared with the results of the 'Boys' test, and a correction is thus obtained. This correction is always small. The 'Thomas' chart is then averaged for the preceding 24 hours, and this average, plus the correction, is taken as the true calorific value for the day. Usually this differs little from the 'Boys' test, but occasionally, due to some mischance, the holder has not collected properly and the two results differ widely. The type of C.V. line given by different coals is characteristic, and the 'Thomas' calorimeter, due to its sensitivity and open scale, proves a good guide to the continuity or otherwise of the travel of the coal in the retort. The collected holder sample is used for determination of specific gravity and is also analysed on a 'Birmingham' type Orsatt. A further sample, collected automatically over mercury, is tested on the 'Bone and Wheeler' apparatus for complete gas analysis.

Owing to the design of the plant, the usually difficult determination of tar yield is rendered comparatively simple, but the methods laid down must be carefully followed if correct results are to be obtained.

Determination of the type of coke given by a particular coal is one of the most important aspects of the full scale test. At least two complete hourly discharges each day are carefully graded, bulk density determinations are made on the 2 in. by 1¼ in. and on the 1¼ in. by ½ in. grades, and samples of the larger coke are reserved for measurement of strength by means of the shatter test. The reactivity of the coke is estimated by a standardized fire test. These two tests are undertaken by the fuel section.

In addition to the usual tests on each wagon for moisture and ash, a further moisture sample is taken hourly just before the coal, en route to the retort house, is weighed. These hourly samples are reserved in a bin, and tested daily. This gives the 'as carbonized' moisture, which on the whole agrees well with the 'as received,' but some very wet coals drain off moisture in the bunkers and so the final test results have to be corrected to compensate for this. Average samples of the coal are also taken by hourly ½ cu.ft. increments, and these are used for grading the coal, estimation of shale content, and determination of bulk density. A representative sample is also prepared for a 'Cronite retort' test and 'full prox.' analysis.

Thermal Yield

To co-relate test works results with those to be expected on a normal works, three assumptions are made: (1) that the oxygen and nitrogen content at outlet retort house is 5% [O_2 = 0.1% N_2 = 4.9%] (2) that to ensure effective purification, the final purified gas shall contain 0.6% of oxygen; (3) that the calorific value of the gas can be adjusted to 450 by addition of B.W.G. made in the retort, and that this has a C.V. of 290. To illustrate how these assumptions are applied, a typical example, taken from a recent test is given.

Corrected gas make ... 17,770 cu.ft. per ton.
Calorific value ... 487 B.Th.U. per cu.ft.
Actual thermal yield ... 86.5 therms per ton.

If no corrections are applied, but the gas simply assumed to be diluted to 450 C.V. with B.W.G. at 290 C.V., the make per ton at 450 C.V. would be

$$\frac{17{,}770\ (487 - 290)}{450\text{-}290} = 21{,}879 \text{ cu.ft.}$$

giving 98.5 therms per ton at 450 C.V.

But this gas only contained 3.7 [O_2 + N_2].

So correcting to give 5% [O_2 + N_2] at outlet retort house, the make per ton becomes 18,009 cu.ft. and as the therms per ton remain unaltered, the corrected C.V. becomes

$$\frac{86.5}{18009} \times 10^5 = 480 \text{ B.Th.U. per cu. ft.}$$

The gas also contained 1.10% of H_2S, and sufficient air has to be admitted to oxidise this ($H_2S + \frac{1}{2} O_2 = H_2O + S$) and to provide the necessary 0.6% of oxygen at outlet purifiers. So the additional oxygen requirements are [final O_2 content less inlet O_2 content] + [half of the H_2S content] —*i.e.*, [0.6 − 0.1] + (½ × 1.10) = 0.5 + 0.55 = 1.05%; and so the 'air to purifiers' should be 1.05 × 4.8 = 5.04%. As 0.55% of oxygen is absorbed in the purifiers, the additional inert content of the gas becomes 5.04 − 0.55 = 4.49%. So the make per ton now becomes 18,009 × 104.49 = 18,818 cu.ft.

and the C.V. falls to $\frac{86.5}{18{,}818}$ = 460 B.Th.U. per cu.ft.

This is the calorific value to be expected in practice, and not 487 as obtained on the test plant.

Diluting with B.W.G. at 290 C.V., the final make per ton becomes

$$\frac{18{,}818\ (460 - 290)}{450 - 290} = 19{,}994 \text{ cu.ft.}$$

giving a final yield of

90 therms per ton of purified gas at 450 C.V.

These figures illustrate the potential thermal loss due to high sulphur content in coal, the higher the H_2S content the greater being the required 'air to purifiers' with consequent lowering of C.V. and reduction in thermal yield.

Investigations

Long-term investigations, by their nature, can only be carried out on a plant which is either already equipped for, or can be modified to suit, the needs of the specified problem. A plant performing experimental work should be linked to a much larger normal gas producing unit, which can act as a shock absorber for the uncertainty of production and occasional peculiar products of a test works. A small, isolated works, with responsibilities for supplying a town or district with gas, is obviously limited in the type of experiment it can undertake, whereas the tie-up with the large Nechells station ensures that Birmingham's gas supplies are not jeopardized by any activities of central test works. Three such investigations have been in hand during recent months, none of which is yet completed.

Eighteen full scale coal blending tests have been carried out using mixtures of caking and non-caking coals, to obtain infor-

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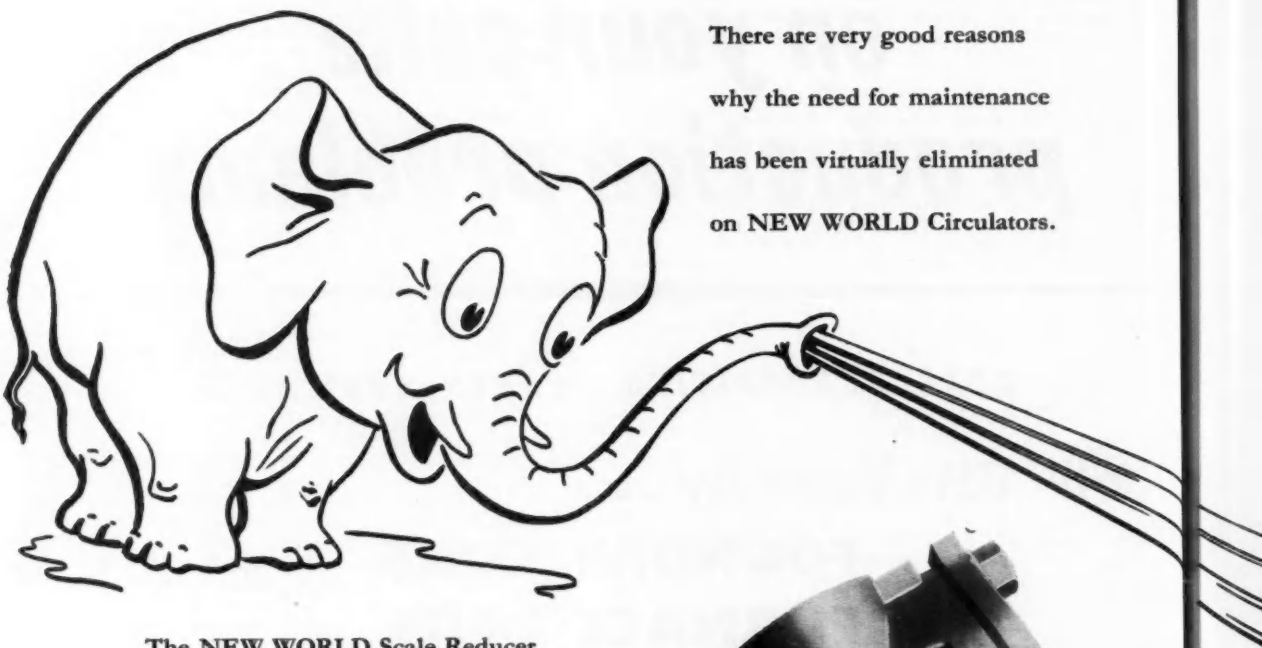

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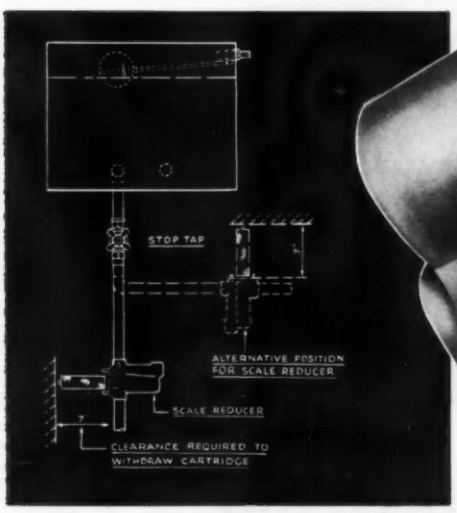

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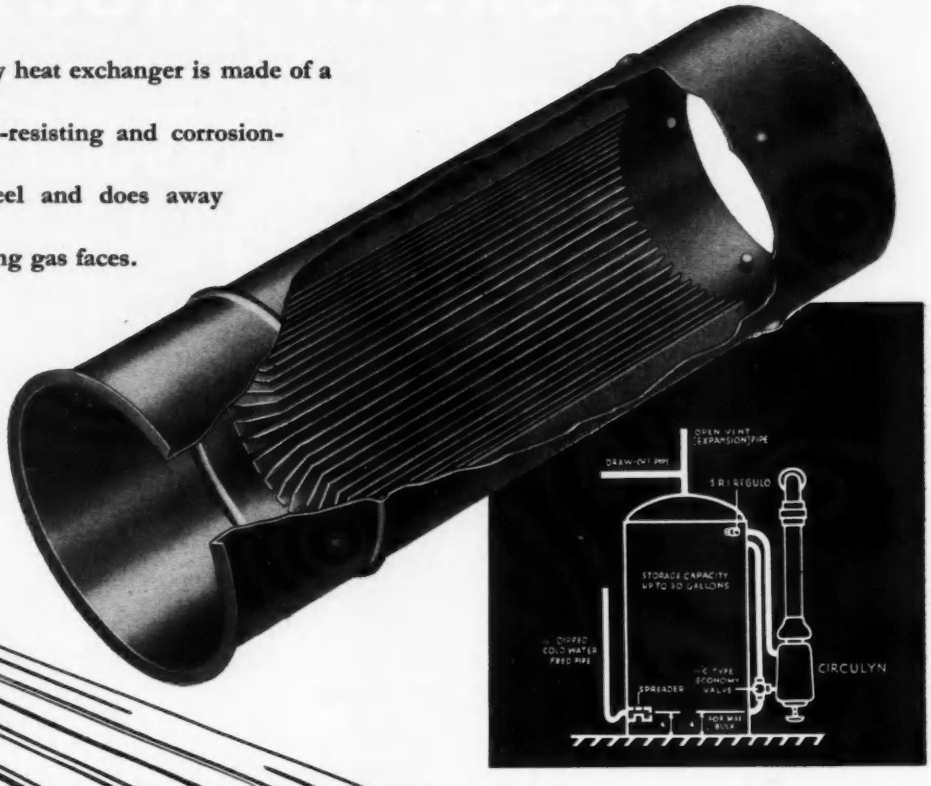

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mation about the workability in the retort of such mixtures, the thermal yield to be expected, the important characteristics of the coke, and the probable economics of the process as a whole. At the central test works, true blending, as at present understood, is not practised, in so far as the coals are not ground to powder form before mixing; but the coals used have in the main been graded small coal of pea or bean size containing only a small portion of fines.

The labour involved in preparing the coal mixtures accurately is considerable, as it involves weighing out small batches at a time of the ingredients, and feeding by hand at controlled rates through a small mixer. Some 500 tons of such mixtures have so far been prepared and carbonized, with varying degrees of success ranging from 'almost hopeless' to 'quite promising'.

Shale investigations have been in progress for about 12 months, with the aim of finding the types and quantities of shale present in our various coals, and the types of bat these produce in the coke, with particular reference to the specific gravity of the bat, and its 'explosive' properties. So far about 75 coals have been examined, including most of those believed to be the worst offenders. A wagon of coal is unloaded and sampled by the usual mechanical means for moisture and ash content. A further sample, of about 8 cwt., is taken by regular ½ cu.ft. increments, and this is hand picked for visible shale, which is weighed, and examined by the fuel section for flying shale properties. The coal is then carbonized in one of the retorts, and the coke is examined by taking a complete hourly discharge, weighing, and grading it. Any shale in the large coke can be picked out, but if preliminary coal crushing has been effective there should be no shale in this size of material.

Each grade of the smaller coke is then put in turn through a simple washer of the 'float and sink' type, and the proportion of material which sinks is determined. These sinkers contain the shale and sometimes an appreciable quantity of perfectly good coke, the proportion of this differing widely with various coals. The sinkers are burnt on a gas fired grate until no combustible material remains. The residue is weighed to give total ash, and is then passed through ½ in. and ¼ in. sieves. These gradings are then finally reported as percentages of 'over ½ in.', and 'over ¼ in.' bat in the original coke. At least two such tests are made on each wagon of coal, and in general very satisfactory agreement is reached. It is possible to estimate roughly the proportion of coke liable to be lost when wet cleaning of coke is practised. Obviously those few coals which give a very high percentage of 'sinkable coke' should not be sent to works with water washers.

'Rochdale Process'

Some investigations into the 'Rochdale Process' have been in progress at central test works since early summer. One retort has been equipped with the necessary pipe work, interlocking valve mechanism, automatic steam purging, flow gauges, and meters to enable carrier gas experiments to be made. Either town gas, blue water gas, or controlled mixtures of the two may be used as the injected medium. The town gas is taken from the mains, and the blue water gas is made in an adjacent retort by steaming a moving coke charge, and drawing the resulting gas away through the normal retort house governor, condenser, and exhauster. It is metered, sampled continuously for C.V. and gas analysis, and passed into the bottom casting of the experimental retort. This method of water gas production was made possible by one of the retorts having been fitted with a controllable device for limiting the swing of the hanger bars.

This enables coke, or non-swelling coal, to be worked through a continuous vertical retort without over-running the extractor, so the discharger door can safely be opened without fear of depositing the whole contents of the retort on the floor. Considerable difficulty was encountered at first in making B.W.G. in this way, due mainly to heavy deposits of a very sticky gum which blocked mains, seized up the exhauster and clogged governors and meters. The trouble has now been largely overcome by installation of oil washers on the hot gas, but periodical blockages still occur. Generally speaking, however, this method provides a steady flow of constant quality carrier gas required by the process. A dozen full-scale tests have been made using the 'Rochdale Process' with a similar number of tests under orthodox conditions for comparative purposes. The work is proceeding.

A COMPRESSED AIR SPRAYING MACHINE

By way of a supplement to his paper on 'Some Functions of a Coal Test Works,' which he presented at a meeting of the Midland Junior Gas Association in Birmingham on February 8, Mr. G. E. Brooke, Superintendent of the Central Test Works of the West Midlands Gas Board, described a compressed air spraying machine now in use in the area. He recalled that in 1944 Mr. J. N. Shorrock, who is in charge of the refractories section of the central laboratories, described a method of retort spraying using compressed air as a carrying and atomizing agent for refractory cement slurries, based on a suggestion by Mr. S. Tweedy. The method gave some good results, both on the laboratory scale and in works practice. Unfortunately, the apparatus involved the use of a closed pressure vessel, and it therefore had to comply with statutory regulations; its capacity was not large and it proved rather more complicated in use than most of the available labour could cope with satisfactorily.

The machine now in use embodies these earlier ideas, although it does not appear at first sight to bear any resemblance to the original apparatus. The idea is now several years old, and in Mr. Brooke's view it has proved its worth in practice. It was first tried on a large scale at the Old Swan Village works, when the lining of the waste gas main started to collapse along the whole length of No. 2 range. This was an old range, but it had still two years' work to do before being finally demolished, and the only solution seemed to be to replace the collapsed brickwork with a sprayed-on compound and to rake out as much of the debris from the main as possible. The idea worked well, and several tons of refractory cement were sprayed on, through cover plates in the side of the main, to a thickness of 3 in. to 4 in. This held for the requisite two years, and when demolished proved to have the strength and consistency of a reasonable quality porous brick.

A steam ejector is mounted on to the delivery chamber of the pump of an ordinary spraying machine. Compressed air, from works mains or independent compressor, is led through this, and then through a hose pipe to a final lance consisting of ordinary ½ in. or ¾ in. open-ended pipe. No spraying attachment is required, the velocity of the air stream being sufficient to atomize the slurry, which is pumped in at an easily controlled speed. The purpose of the ejector is to give low pressure conditions at the pump delivery to enable easy, steady, slow pumping to be maintained. The compressed air supply is used to keep the slurry well mixed, and a supply is also led to the foot strainer of the pump to blow out any obstruction that may form there. This is the only place where blockage troubles have been encountered, and these are easily dealt with. A main air control valve and pressure gauge complete the outfit.

The advantages claimed for the apparatus are simplicity of construction and operation (the only controls are the air pressure valve and the speed of pumping); freedom from blockages, and ease of replenishing the supply of cement (there are no cover plates to unbolt); and its versatility. In addition to retort brickwork and ironwork repairs, it is very effective for limewashing in awkward places, provided the wash is made up thickly. Top dust is first blown away, and then the slurry is slowly pumped into the air stream.

The original Swan Village machine was largely home made. The present one was made to requirements by a well-known firm of spraying machine manufacturers. It is not claimed that high pressure spraying is the answer to all leakage problems, or that repairs by this method are equal to good welding.

But it is good for top and bottom firebrick, ironwork joints, and, owing to its speed of application, it is useful for keeping other bad retort leakage in check until more permanent repairs can be carried out. Mr. Brooke said it would prove a very useful weapon in the 'hot patcher's armoury.' Further information on the method, and advice on the use of cements, will be found in Mr. J. N. Shorrock's paper given to the Midland Junior Gas Association in December, 1944 ('GAS JOURNAL,' Vol. 245, pp. 114, 186).

Steam Utilization in Gasworks*

By G. HALL, M.INST.GAS E. Assistant Works Engineer, Luton
(Since appointed Works Engineer, Chelmsford)

LUTON works has a congested plant layout. There are virtually two complete works joined together (at least as far as gas streams are concerned) at the benzole plant, and the plant layout presents many difficult problems of transmission, whether of gas, steam, liquor, or solid materials.

The steam raising plant can be enumerated under three headings:—

I. *Vertical Retort Section.*—(a) No. 8 waste-heat boiler handling waste gases from 12 72-in. lambently heated retorts, and eight 57-in. downwardly heated retorts. Steam evaporation 5,200 lb. per hour from feed water at 120°F. Fan drive via vee belts from a 20 H.P. squirrel-cage motor. (b) No. 9 waste heat boiler handling gases from 12 65-in. upwardly heated retorts. Steam evaporation 3,400 lb. per hour from feed water at 160°F. Fan drive by steam turbine exhausting through heat exchanger to atmosphere.

II. *Horizontal Retort Section.*—No. 10 waste-heat boiler handling waste gas from 13 horizontal beds of eight retorts, with provision for producer gas augmentation; capable of providing a surplus of 7,500 lb. per hour. Fan drive by Sisson reciprocating steam engine.

III. *Solid Fuel Boilers.*—(a) No. 4 Lancashire boiler, 28 ft. × 8 ft. 6 in. originally fitted with standard grate, but converted to breeze burning grates and forced draught in the spring of 1952. Steam-raising capacity on breeze approximately 5,000-5,250 lb. per hour. (b) No. 7 Lancashire boiler, 30 ft. × 8 ft. 6 in. converted as above, Spring, 1952. Steam-raising capacity on breeze approximately 5,600-6,000 lb. per hour. (c) No. 2 Lancashire boiler, 23 ft. × 8 ft. Converted as above in Autumn, 1951. Steam-raising capacity on breeze approximately 4,750 lb. per hour.

The steam from all the works boilers is saturated.

The total steam-raising capacity of the works thus amounted approximately to 32,000 lb. per hour, and although at times of peak requirement a steady steam main pressure was seldom maintained, theoretically at any rate, with a figure of 2,200 lb. of steam per ton coal carbonized per day, there should have been ample capacity. Under these conditions failure to maintain adequate steam pressure could be due to inefficient steam utilization, inefficient waste heat recovery, and poor operation of the solid fuel boilers.

Although faults certainly did lie in the last two items, they were not considered to be prime factors, particularly since economy in steam utilization might ultimately enable one or more of the solid fuel boilers to be shut down. Serious consideration was then given to improving the efficiency of steam utilization.

The factors which could contribute to inefficient utilization were enumerated and considered in turn. They were bad lagging, poor trapping, and the use of live steam for process heating work.

Neither the steam mains which had been effectively lagged nor the trapping gave cause for serious criticism, but many uses of live steam for process work certainly did. The plants which at that time operated entirely on live steam were: (a) Vertical retorts, steaming; (b) purifiers, heating; (c) sulphate of ammonia plant, still and dryer; (d) benzole plant, heat exchanger and still; (e) lobby, space heating; (f) water heating (calorifiers). Here was a tremendous potential saving provided that adequate exhaust steam could be made available at the temperature and pressure required; and it was decided to attempt complete conversion at the earliest opportunity.

Steam Distribution and Utilization of Exhaust Steam

When the steam main layout was contemplated, two prime factors, both of which were independent—choice of pressure and size of main—had to be considered.

Our aim was to utilize exhaust steam for process work and heating. The lower we fixed the pressure the greater would be the quantity of usable heat (latent heat) available per pound, and since engine and pump efficiency varies as the back pressure, the lower the steam demand for any given duty. In other words, provided the temperature requirements of the process were met, the lower the steam pressure the greater the overall efficiency of heat utilization. After consideration of the heating requirements (an allowance of +28°F. above theoretical maximum temperature was made) it was decided to work at a pressure of 10 lb. per sq. in. In regard to size of main, this was based on calculation of the permissible pressure drop from the point of 'feed-in' from either engine or pump, and on the requirements of the sulphate of ammonia plant.

The choice of mains layout on any works must be influenced primarily by the relative location of steam supplier to steam user; obviously it varies from one works to another. On a compact plant in which points of 'feed in' and 'feed out' are interspersed, the omnibus circuit arrangement may be considered the more suitable. In this method smaller mains can be used, as the lengths of steam delivery are comparatively small, and hence pressure drop is less. The cost of installation in this case is usually appreciably lower than with the trunk and branch method.

On works where a large steam consuming unit is some distance from the exhaust steam supply, however, the chief consideration is to deliver the weight of steam required with the minimum pressure drop; and the answer lies in the system of trunk main with branches.

A convenient place for the erection of the first lengths of exhaust steam main appeared to be adjacent to the horizontal retort house purifiers. From here exhaust from a number of pumps which worked throughout the 24 hours could be conveniently harnessed. The purifier heating, which up to then had been on live steam, could be converted.

At the time of fixing and putting into operation the first length of main, we had no conception of the ultimate economies which were to come, and we were cautious of becoming involved in heavy expenditure. The size of main was fixed at 2½ in. diameter, though we were not sure that this would be adequate. As it turned out, the layout at the horizontal retort house end of the works lent itself perfectly to the omnibus circuit system. The original 2½ in. pipe proved adequate, and, in fact, considerable additions have been made.

The main was erected overhead, and the excess pressure in the main was controlled by a valve of the dead-weight pattern. Both spring and weight loaded types have been tried, but in our opinion the latter gives more satisfactory results, particularly at times of very light consumption on the main. Ample discharge capacity should always be allowed.

Steam discharge rates for pumps, engines, etc., can usually be obtained from the various manufacturers. Although the steam consumption of any particular size of unit depends on the working pressure, the following figures may act as a guide:—

Pumps.—100 lb. of water delivered per lb. of steam used against a back pressure of 10 lb. per sq. in., when the steam pressure and delivery pressure are approximately 100 lb. per sq. in.

Engines (single cylinder).—At 100 lb. per sq. in. against 10 lb. per sq. in. back pressure.

50 lb./B.H.P./hour	... ...	Full load
50 " " "	... ...	¼ load
65 " " "	... ...	½ load

In each case the steam is assumed to be saturated. If superheated steam is used, the above figures can be reduced by approximately 7% for each 50°F. superheat. These are average figures and vary with engine efficiency, steam, and exhaust conditions.

Having obtained the approximate weight of steam being discharged into the system per hour, the next step was to choose

* From a paper to the Eastern Junior Gas Association, January 26, 1955.

the plant which could best utilize it. I should point out here that in the early stages this procedure was entirely a question of trial and error—*i.e.*, adding more and more load on to the main until the surplus steam ceased, and then coupling in another feed. At that time we were not aware that data of the type in the last paragraph were readily available. The method of heating the purifiers was to pass live steam through coils lying just above the oxide level. These were adapted for use on exhaust steam. The steam coils in the purifier boxes lay some 12 in. below the level of the discharge pipe, and a 'lift fitting' was used to obviate water-logging. The pipe outlet was connected to a balanced pressure thermostatic trap with strainer.

As we began to feel the benefits of our first exhaust steam installation, it was decided to extend the mains to take in more pumps and engines, and also to increase its use in space heating in the office block, messrooms, changing rooms, drying rooms, ablutions, maintenance shops, etc. The various units had previously been heated by either gas or coke fires with the exception of the laboratories, which had operated on a closed circuit calorifier system heated by live steam, and the maintenance shop which had overhead steam pipes using live steam—these being augmented during extremely cold weather by the heat from overhead gas lights. There appeared to be great scope for providing a more satisfactory system of heating at a reduced cost.

After completion of the first six space heating installations, it was found that an approximate relationship existed between room volume and heating area. Consequently further installations were made using as a guide the figures. Although the general construction and location of doors, windows, etc., differed considerably, the estimates were quite satisfactory.

In every case the heating load was considered to be on a 24 hour day, seven days a week, basis, so that not only was the room temperature maintained reasonably constant at all times, but serious fluctuations of pressure on the exhaust steam main were obviated.

Table I.—Space Heating Requirements.

Description	Volumetric capacity cu. ft.	Min. temp. maintained °F	Cu. ft. of air heated/sq. ft. of heating area (by steam as 10 lb. per sq. in.)
Clerks' Office (Typists)	9,260	65	58
Clerks' Office (General)	8,556	65	66
Drawing Office ..	3,530	65	50 } Suggest 66-68
Engineer's Office ..	4,162	65	70 }
Small Office	1,684	70	70
Maintenance Shop (With sky lights) ..	27,000	60	42

The steam requirement on the radiators was taken as one-third lb. steam per hour per sq. ft. of heating surface. In the case of the drying rooms this figure was multiplied by two.

Water Heating

The calorifier offers itself as the most satisfactory method of utilizing the heat of available steam for water heating purposes. In deciding the size of cylinder an allowance was made of 3 gal. of water at 120°F. per man per wash-off. To obtain this final temperature, 1½ gal. of hot water at 190°F.-200°F. were required per man, plus an equal amount of cold water. An allowance of 3 as a safety factor means that the calorifier capacity for 50 men had to be $50 \times 1\frac{1}{2} \times 3 = 225$ gal.

The rate at which the quantity of water is to be heated is dependent on the time between wash-off periods. In our case this figure is four hours (*i.e.*, between the lunch-break and finishing time). Table II gives the length and diameter of pipe required for a coil of given duty. Using steam at 10 lb. per sq. in. and a coil diameter of 2 in., the length of coil would be $\frac{0.125 \text{ ft. per gal. water} \times 3 \text{ to allow for loss}}{4}$ of efficiency due to scale formation on the water side.

Regarding material for the coil, copper is admirable, but our opinion is that bearing in mind the greater effect that resistant films, etc., can have on performance, the use of standard wrought iron tube is justified, especially where a very high rate of heat transfer is unnecessary. The cost of the W.I. tubing is, of course, far less than copper.

Steam to the heating coil was fed via a strainer to the thermostatic control valve. This valve, the temperature of operation of which could be adjusted to 180°F. ± 20°F. was of the single-seat completely shut-off pattern. This complete shut-off was found to be necessary as even a small steam weep caused boil-over at the expansion pipe during night periods between draw-offs. The thermostat bulb was fixed in the top of the tank in which the coil is fitted, and the coil is trapped by a ball float valve.

Table II

Time for Heating 62°-212°F.	Nominal Pipe dia. (in.)	Steam pressure in coil lb. per sq. in. gauge				
		5	10	25	50	100
1 hour ..	1	0.452	0.245	0.179	0.134	0.098
	1½	0.344	0.187	0.136	0.102	0.075
	1½	0.294	0.160	0.117	0.087	0.064
	2	0.230	0.125	0.091	0.068	0.050
	2½	0.193	0.105	0.076	0.057	0.042

An alternative to the thermostatic control valve would be the liquid expansion type thermostatic steam trap.

Boiler Feed Water Preheating

In our case feed pumps are provided on the waste heat boiler feeds. The water is softened by base exchange and reaches the tanks at a low temperature (about 55°F.).

As the warmer weather reduced the space heating demand, a surplus of exhaust steam was available even when all vertical retorts were on exhaust steam. An obvious economy was to boost the water temperature on the feed to the standard type of preheater and thus raise further the boiler feed temperature. As time was short and no labour was available for making up a large coil, it was decided to couple two large steam radiators into the main and lower them into the feed tank. The advantage of this step was that a radiating surface of considerable area was provided in a very compact form. The outlet of the radiators was trapped with a ball float trap, and as the condensate was oil contaminated, it was discharged through an oil trap to waste. The temperature of the tank water rose from 53°F. to 140°F., and the water temperature at the boiler inlet (*i.e.*, after the secondary preheater) from 125° to 185°F.

Provision was made in this simple arrangement to replace the exhaust steam feed by the discharge from the constant blown-down at time of exhaust steam shortage. In the latter case heat would be available, and consequently the temperature rise would be smaller, but it would constitute a saving. The likelihood of sludge build-up in the radiator was not overlooked, but during a period of three months the units have operated without showing signs of blockage.

There may be works which utilize old Lancashire and Cornish boilers as boiler feed tanks. We have one such unit in which the fire-tubes are intact. It is intended to seal each end of the fire-tube with a welded plate and feed any surplus exhaust steam into it as required. The idea is not original, but is mentioned to show that many things can be done without incurring heavy expenditure. One must always bear in mind that for each 10°F. rise in feed water temperature a reduction of 1% in the boiler fuel can be achieved.

We have found that a steam-operated sterilizer unit is very suitable for providing hot water for tea making.

The exhaust steam main system has gradually been extended during the last three years. As each new steam consumer has been added, additional supplies from pumps, engines, etc., have been connected. This development has gone on by easy stages, and care has been taken to assess the affects and results before further steps have been taken. Only too often, even in the most carefully thought-out schemes, the introduction of a new system can upset the balance of operation. This has been our experience in the utilization of low-pressure steam.

After the success of the scheme which had included almost the entire horizontal retort house section, it was decided to include all steam suppliers and users at the vertical retort section. Here it was felt that the trunk branch system would prove more satisfactory because of the different layout of the steam supplying and utilizing units. There would be a surplus of steam at that end of the works and a main of not less than 4 in. would be required to transmit this to a central point (in this case the sulphate of ammonia plant) without excessive pressure fall. The 4 in. trunk main joints were flanged with all the branches screwed socket.

Retort Steaming

An obvious step was the utilization of exhaust steam on the vertical retorts. These presented the ideal load factor with a near 24-hour demand. The steam jets were immediately

(*Concluded in Column 2, page 445.*)

The interior of the new booster house at Leamington showing turbo-boosters and instrument panel.

West Midlands Medium Pressure Distribution

Leamington Spa and Warwick District System

As a result of the West Midlands Gas Board's decision to interlink production centres in suitable cases and shut down small uneconomic works, plans were prepared to extend the Coventry high pressure system through Kenilworth to Leamington and Warwick, with the object of terminating gas production at Warwick. The new booster installation at Leamington was completed and put to work in the summer of 1954, when production ceased at the Warwick undertaking. This provides a control centre at Leamington for all gas transmission and holder control within the area Kenilworth-Leamington-Warwick, and enables the Leamington undertaking to operate on base load with a daily output between 4½ and 5 mill. cu.ft. per day of coal gas.

Distribution Linkages

Under normal operating conditions the Leamington plant supplies gas through a medium-pressure link main between Kenilworth-Leamington-Warwick into the low pressure distribution system via breakdown pressure governors, and also provides bulk supply to storage holders at Warwick through a volumetric governor. Alternatively, when additional gas is required above the Leamington production, gas is taken into the common system from the Coventry high pressure system via volumetric governors and may also be taken direct into the Leamington holders if needed. This requirement for two way transmission in a common main affects the choice of instrumentation and also necessitates safety equipment to safeguard the Coventry high pressure system. Control is effected from the shift supervisor's office which is an annexe to the main building and is in direct communication with the outlying stations. This control will ultimately be entirely automatic.

The Booster House

The building consists of a basement and superstructure constructed in common red bricks with rust facings (Fig. 1). A continuous reinforced concrete slab forms a foundation and serves as a sub-floor for the basement. The flat roof is constructed of reinforced concrete hollow beams with centrally placed lantern light for ventilating purposes. The whole of the ground floor is constructed of open type steel panels. The walls are tiled internally up to 5 ft. 6 in. above floor level with glazed tiles coloured eau-de-nil. All gas supply, steam, water, and electric connections and drainage pipes are accommodated in the basement, being of easy access, and enhancing the internal appearance of the house.

The whole of the electric installation is flame-proof and the main switchgear, etc., is situated in the annexe, from which the shift supervisors operate. The annexe is fitted with a reinforced plate glass window affording a full view of the booster house and control panel. Since the house is very near domestic property exhaust steam passes through a brick and concrete silencer unit and will ultimately be connected into the low pressure steam ring main.

The boosting equipment, supplied by the Bryan Donkin Company, Ltd., consists of one electric and one steam driven booster. These boosters are 5-stage Rateau turbo type, the

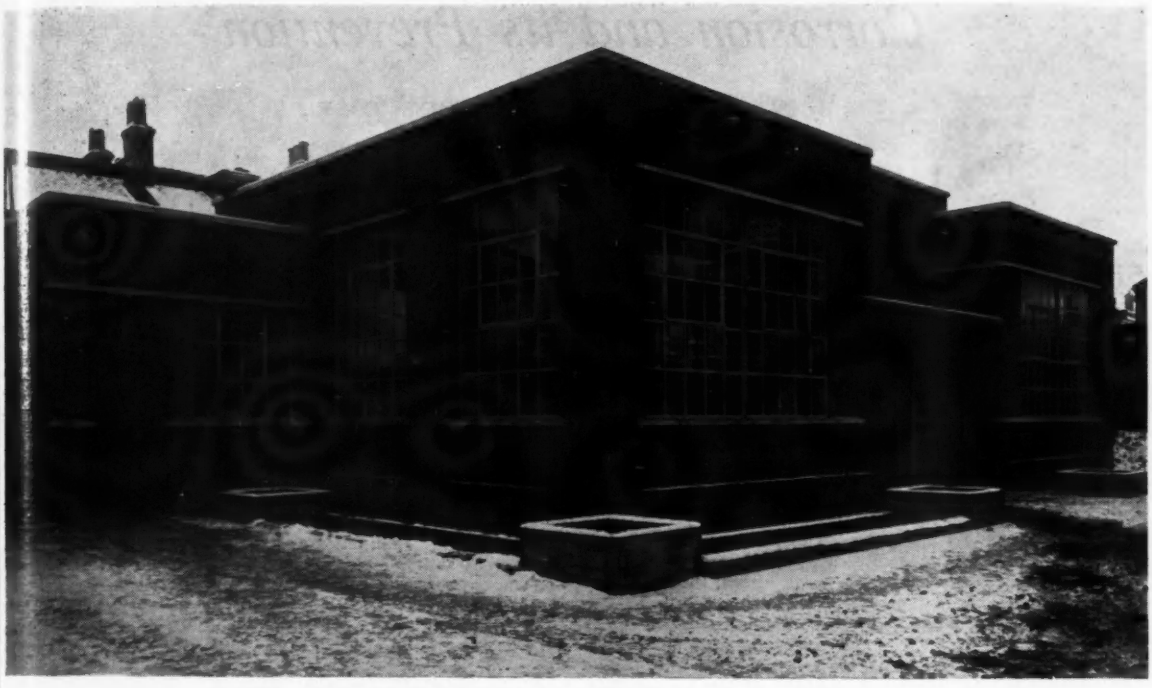

Fig. 1. An exterior view of the new booster house at Leamington.

shaft running in ball bearings, giving a pressure difference of 70 in. w.g. at 3,700 r.p.m. Provision has been made for the installation of an additional 150/200,000 cu.ft. per hour unit in the future. The electric booster is driven by a flameproof electric motor through a David Brown speed increasing gear and a Fluidrive Engineering Company's fluid coupling.

The steam booster is driven by a Bellis and Morcom single cylinder vertical enclosed self-lubricating engine, through David Brown speed increasing gears. The glands on the boosters at the point where the shafts pass through the casings are of the carbon ring type, packed with suitable grease. The glands at the outlet ends of the boosters are of the double seal type, a bleed off section being taken from between the seals back to the inlet, thus ensuring a positive seal at the outlet ends of the boosters.

Governing of the outlet pressure at the booster is effected by diaphragm type pressure regulators, which on rise of booster outlet pressure actuate the scoop control on the fluid coupling, reducing booster speed. Similarly, on the steam driven booster, the outlet pressure is controlled through the engine speed and hence through the booster speed by a diaphragm steam regulator, which in turn is controlled from the pressure in the outlet main.

The Governors

All governors throughout the link are of the 'Jeavons Emco' type. The volumetric governor installed in the Leamington booster house operates in accordance with the normal principles of volumetric governors except for the fact that an adjustable valve serves the purpose of an orifice plate. The layout does not allow for insertion of the usual flow straightening pipes before and after the orifice, but this is not in any way detrimental to the performance of the governor which works within the normal limits of accuracy.

The salient feature of the equipment is the fact that the controls are mounted in a special cabinet, and increase or decrease of volume is achieved by turning a knob on the outside of the control box. The cabinet is constructed to facilitate simple maintenance.

An inlet pressure control device is also incorporated in the equipment to conserve predetermined minimum pressure conditions in the supply main to the volumetric governor. The instruments used throughout the system are by Walker Crosweller & Co., Ltd., and consist of flow and pressure recorders and standard water and mercury gauges, the flow recorders being fitted with integrating units. In all electrically operated instruments a system of pressurizing is used to counteract risk of explosion. This system consists of pressurizing the motor drives with an air supply provided by two small air blowers in the annexe. Failure of the air blowers or the opening of the instrument cases automatically cuts off the electricity supply to the instruments. The orifice plates and all instruments are installed so that by the operation of a master four way cock on the control panel flow of gas in either direction can be recorded.

STEAM UTILIZATION IN GASWORKS—Contd. from p. 443.

enlarged to enable the maximum required weight of steam to be fed into the retort at a pressure of 10 lb. per sq. in. Some 50% of the retorts were then changed to exhaust steam. The remaining 50% were left on live steam to permit adjustment of the calorific value, since it was not certain to what extent fine adjustments of pressure—*i.e.*, ± 1-2 lb. per sq. in. could be made on the 10 lb. per sq. in. supply to the retorts. Experience has since shown us that fine control can be obtained and maintained fairly constant. Though no pressure regulator has yet been fixed, this is considered advisable, but not essential in our particular case. All retorts are now fed by exhaust steam, though provision is made for using either live or exhaust steam as desired.

The vertical retort steaming provided the point of balance of the exhaust steam system, and our aim has been to work with a variable number of retorts on live steam, so that at times of shut-down on the sulphate of ammonia plant (*i.e.*, on Sundays) additional retorts can be put on to exhaust steam, to maintain a pressure balance in the system, without excessive blow-off. Of course, as each extension has been added to the main, a greater steam storage capacity is available, and a more constant pressure is maintained.

As each step has been taken in extending the system, some benefit has been felt in the boiler house. There has been a steady reduction in the quantity of coke and gas used on the works during the past four years. Against this, the electricity consumption has risen sharply as a result of putting into use additional electrically-driven plant and equipment.

Corrosion and its Prevention*

By JAMES P. RENTON, ASSOC.M.INST.GAS E.,
Edinburgh.

DISTRIBUTION of gas from holder to meter incurs a maintenance cost which has much influence on the selling price of gas. Any saving in the maintenance of mains and services is a valuable contribution to the industry as a whole. We should try to lessen the effect of corrosion on our underground supply system.

As yet, we have been unable to evolve a cast iron alloy on a commercial scale which will remain free from corrosive attack in the soil. Cast iron, underground, reacts to corrosion in various ways. Comparatively large areas are practically unaffected while smaller areas receive attack in irregular formations or concentrated attack which leads to pitting and eventual perforation.

Electro-chemical corrosion is associated with the flow of an electric current set up by the existence of electrical potential differences on the pipe surface or in the soil surrounding it. At the anode, or area of corrosive attack, the current is carried into the soil by particles of metal which leave the pipe and go into solution. Hydrogen is liberated and passes to the less reactive area of the pipe, the cathode. The hydrogen forms a layer on the pipe and spreads as a protective film which tends to reduce the intensity of the current flow and stifles the corrosive reaction at the anode. If the hydrogen film remains, a point is reached where the cathode becomes 'polarized' and corrosion ceases at the anode.

Sulphate Reducing Bacteria

Soils which are free from oxygen are generally non-corrosive, but, in anærobic soils such as heavy waterlogged clay containing traces of sulphates and organic matter, sulphate reducing bacteria can cause intensive corrosion to both cast iron and steel. These bacteria act as catalysts to the reduction of sulphates to sulphides by molecular hydrogen which is obtained from the surface of the pipe. The oxygen released in the reaction causes further removal of the hydrogen film from the pipe resulting in 'depolarization' and the continuation of current flow which causes serious attack by prolonging galvanic corrosion. In cast iron the iron element goes into solution leaving a skeleton structure consisting mainly of iron phosphide and graphite. The shape of the pipe is maintained, but it is porous, soft and easily broken. The areas affected are generally small and localized. The failure of steel is generally more rapid as it has no framework of graphite and the walls are thinner. The corrosion product takes the form of fairly loose scales of rust which do not protect the metal but allow corrosion to proceed.

Iron in contact with pure water has only a slight tendency to displace hydrogen and pass into solution. The corrosion product, ferrous hydroxide, is only slightly soluble. A saturation point is reached and the reaction slows down. When the water is acidic the displaced hydrogen is liberated freely as gas and the iron is taken more rapidly into solution. Leakage of chemical effluents from factories or chemical works can cause serious corrosion. The presence of ashes and clinker round the pipe should also be avoided, as residual sulphur is washed out with rain, causing acid conditions round the pipe.

Fusion is caused by the failure of the insulation of an electric cable in close proximity to the pipe, when an arc is struck which melts the pipe and perforation occurs. The current from tramway systems should return to the power house via the rails. In practice part of the current may pass into the soil and along a conductor, which may be a pipe or cable sheath, and later the current returns to the rails. When the current leaves the pipe small particles of metal are removed which eventually result in pitting and perforation. There may be more extensive damage caused by current transferring from one conductor to another.

It is common practice to provide a good protective covering for steel or malleable iron pipes, and the greater the supervision of the actual application of it, the better. The full co-operation and understanding of the operative are essential for this important work. The recognized materials for protection against corrosion today are petroleum bitumen or enamels derived from coal tar reinforced with glass fibre tissue, woven asbestos fibres, or cellulose wrapping.

Touching-up and Wrapping of Joints

Steel mains and services generally have a reinforced coating. Cast iron mains normally have one or two applications of hot enamel, and pipes are usually coated in the factory. The joints and any damaged parts of the coating are protected on the site. A great deal depends on this touching-up and the wrapping of joints, and the work should be under close supervision to ensure that the surface of the pipe is clean and dry before the coating is applied. The coating should be a protective bandage of a good proprietary make or one recommended by the makers of the pipe. The wrapping must be firmly applied, maintain intimate contact with the pipe, and marry with existing wrapping. For certain types of couplings made of steel, special light alloy sectional moulds can be employed to give a moulding of pitch round the entire joint homogeneous with the existing wrapping. In transport the pipes should be well protected from abrasion, and in handling only canvas slings or end clamps should be used. Care in excluding stones from the back-fill round the pipe should be strictly exercised. Extra protection such as pitch troughing should be used in highly acidic soil, where chemical effluents or ashes and clinker are likely to come in contact with the pipe. Sand back-fill should be practised in heavy soil, though chalk is better if available.

Cathodic protection is either by galvanic anode or applied current. I have installed several magnesium anodes in the Edinburgh area at points which were originally anodic sections. At one point where there was trouble with perforation once annually (although the pipe was only eight years old) no further trouble has been experienced during the past two years. A universal meter was used to measure the pipe to soil potentials. The anodes are installed below the level of the pipe in moist soil about 10-15 ft. away and they are connected to the pipe with an insulated copper cable. The connection on the main is insulated and waterproofed by a moulding of pitch.

Apply Protection when Laying Pipes

The economics of galvanic anode and applied current systems depends largely on the condition of the protective coating of the pipe. It is therefore advisable to apply protection when the pipes are being laid. The planning of a cathodic protection system is a highly specialized technique and the work should be carried out by experts who can assess which system is best suited to the conditions, or decide if a section only requires protection. The conductivity of the soil is a measure of its corrosiveness. The greater the resistance the less the corrosive effect. This method of locating the areas likely to cause corrosion is widely used today. The effectiveness of cathodic protection is normally assessed by tests of earth-to-pipe electrical potential difference.

Perfection in the protective coating of pipes should be sought. Cathodic protection should be considered for new pipe installations or sections where clay exists or in areas where corrosion has been severe. Where virgin soil is being traversed, electrical surveys should be made and chemical analysis of the soil should be carried out at the planning stage of a proposed new pipe installation.

* From a paper to the Scottish Junior Gas Association (Eastern District), Dundee, January 8, 1955.

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OP7

Some Notes on Gas in France*

Gaz de France, said the *Journal des Usines à Gaz* in November, has been living through a period of intense activity. The last item in the re-arrangement of gas supply in Paris, the coke ovens at Alfortville, had come into commission with production in two batteries, and it was anticipated that this station too would be receiving the first supplies of gas from the East. On October 23 the President and the Director-General of the national gas service, accompanied by the persons principally responsible for the installation of the great arterial main, were shown the transmission station at Carling.

The extent of this 'great artery from the East' is shown in the map reproduced in Fig. 1. The Editor recalls the circumstances which led up to the conception of this project. The Lorrain coal basin contains enormous reserves but, until recently, none of these coals was suitable for coking and the steel industry could not utilize its local deposits of iron without calling upon the cokes of the Ruhr and the Sarre. This gave rise to additional costs which hampered its development. Researches undertaken, both at the collieries and at the metallurgical coke ovens, having succeeded in the production of good coke from almost exclusively Lorrain coals, nothing now opposed the development of the coke ovens of the East, which accordingly has gone ahead, with governmental encouragement. This was bound to result in the liberation of large volumes of gas for which there would be no local market; hence the idea of transmitting this gas to Paris, feeding a number of undertakings on the way.

The accomplishment of the project is briefly described in an article by M. A. Amsler, Chief of the Works Department (Eastern). The mains were laid during 1952 and 1953. The erection of the several stations for sectional governors and reception went on during 1953. Final tests were achieved with that of the last section, St. Dizier-Paris, which is just finished. The main was tested at about 52 atmospheres pressure. At the time of writing, the principal main was being brought into operation from Lorrain to Alfortville, the chief points fed being, in chronological order, Vitry-le-Francois, Alfortville and Rheims. Supplies to Commercy, Ligny-en-Barrois, Bar-le-Duc, Saint Dizier and Epernay will follow in the near future. Services in the areas at the east end of the system are practically complete. (The pressures of transmission are extremely high.) During the winter 1954-55 gas compression will be effected at 47 kg. per sq. cm. (670 lb. per sq. in.) at Carling, 47 kg. at Burbach and 4 kg. (57 lb. per sq. in.) at the coke ovens of Neuves-Maisons. The last named station will serve Nancy. With the pressure of 47 kg per sq. cm. at Carling the capacity of this feeder from the East to Paris is estimated at 700,000 cu. m. (24.7 mill. cu.ft.) of gas per day. The recompression station (from 40 to 60 kg. per sq. cm. = 570 to 850 lb. per sq. in.) at Blenod-Avrima will be finished in the summer of 1955; this will bring the capacity of the main to 1,200,000 cu. m. per day (42 mill. cu.ft.).

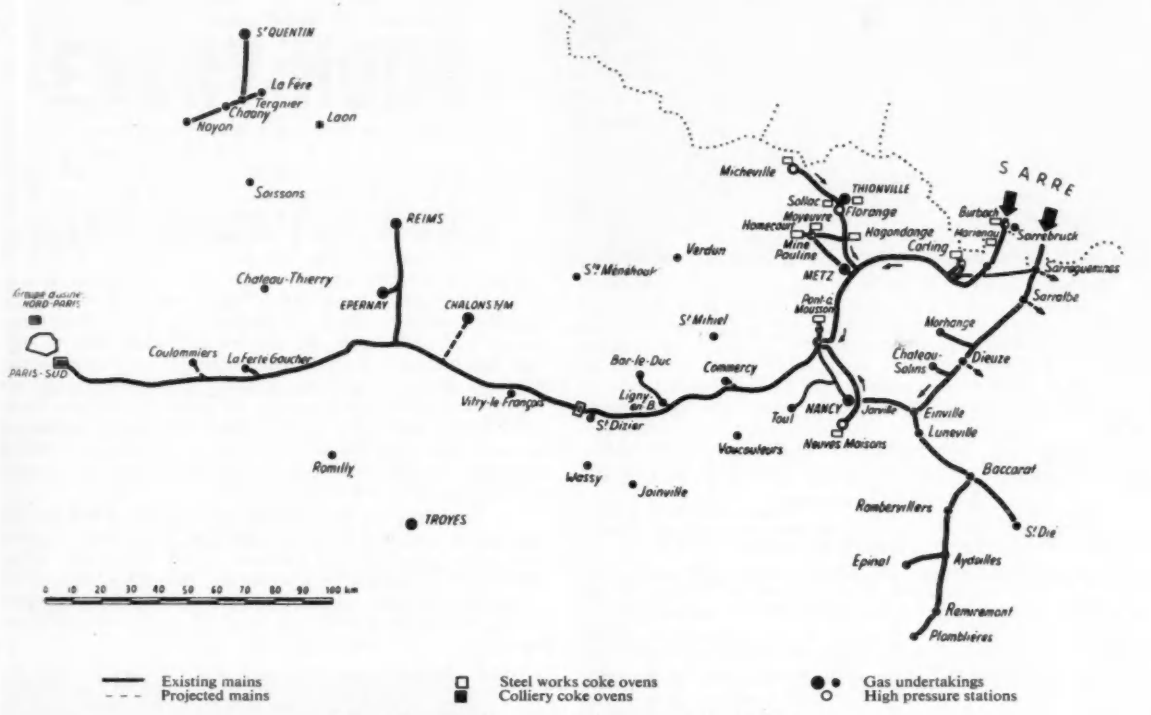

Fig. 1. The ramifications of the Sarre-Paris gas grid

This connection between the two regions, the one of great industrial activity, the other of large gas consumption, has excited great interest. The new 'gas artery' will be an effective element in national prosperity. The automatic equipment on the station at Nancy for the reception and distribution of the coke-oven gas is described by M. F. P. Clerc, Engineer, Control and Regulation.

Coking Research

M. A. F. Boyer, chief of research on carbonization in the laboratories of Cerchar, describes and discusses the methods there in use in research into the mechanical properties of coke. These researches have for their particular objects, first, to understand the fundamental reasons for the behaviour in coking of Sarre-Lorrain coals with high volatile content, and then to suggest remedies.

The methods are grouped under the headings, fundamental studies (chemical, microscopic and thermal), coking

* Abstracts from the Journal des Usines à Gaz for November and December by Ashton.

in the experimental oven, tests of agglutination and swelling and, finally, fissuration tests.

It is concluded that, though a great diversity of tests may be applied to this problem, a very small number are really fundamental; *e.g.*, index of volatile content, index of swelling in the crucible, the standardized dilatometer—and in case of trouble with fissuration, temperature of resolidification and curvature, these being too recent to have the sanction of experience though promising in a domain which has hitherto evaded laboratory control.

Sulphur

M. F. Delarozière, formerly Engineer to Gaz de France, discusses the sulphur crisis in member countries of O.E.E.C. during the Korean War, the present situation and future possibilities. (Facts and figures relating to the United Kingdom were given in Paper 13 of last year's Institute of Fuel Conference in which the position was reviewed by Mr. W. A. M. Edwards.) During the sulphur crisis there was a deficiency in O.E.E.C. countries of 356,000 tonnes for the year 1954-55, but in the meantime American demand for their native sulphur has declined and O.E.E.C. countries had an excess production of 390,000 tonnes, equal, that is, to the former deficit. The point that M. Delarozière makes is that the recovery of sulphur in the carbonizing industries should be stepped up in order to avoid future dependence on imported elemental sulphur. This question demands the attention of gas engineers who, in a new crisis, would be called upon to contribute to the solution of the problems involved. It is estimated that it is technically possible to obtain annually 308,000 tonnes of sulphur from the oil, town gas and coke oven industries at the present rates of production in the O.E.E.C. countries.

Marseilles-Bandol Gas Grid

There was already a system 20 km. (12/13 miles) in length between Toulon and Bandol when Gaz de France took over in 1950 the supply to Aubagne and a connection between that town and Marseilles had been projected in 1949. The distance between Aubagne and Bandol is only 38 km. (23 miles) with a number of townships between. The two were therefore connected and now there is a system extending from Marseilles to Toulon. This system and its equipment of automatic telemeasurement and other equipment is described by M. Touly, Director of the Low Voltage Current Division of Ste. Hewittic.

News and Notes

Professor Ribaud, Director of Research of Gaz de France, retired on November 1 after more than 20 years' service, devoted mainly to the gas industry. Dr. Ribaud occupied the Chair of High Temperature in the Faculty of Science of the University of Paris and has been Member of the Academy of Sciences since 1947. A member of the Committee of the Association Technique de l'Industrie du Gaz since 1942, Dr. Ribaud has contributed lavishly to the technical and scientific literature of the gas industry. In a recent citation M. Le Guellec, President of the Council of Administration of Gas de France, mentioned his work on gas transmission over long distances, the development of radiant heat, the use and treatment of petroleum products, as well as general work on the improvement of the production, distribution and utilization of gas. Readers in England will recall the account of some of the researches under Professor Ribaud's direction which were described by M. Agron at the last Autumn Meeting of the Institution of Gas Engineers (Comm. No. 455).

While we in Britain have been celebrating last year the bicentenary of the birth of William Murdoch, our French colleagues have celebrated the 150th anniversary of the death on December 1, 1804, of Philippe Lebon, who is regarded in France as occupying much the same position as that of William Murdoch in this country, *i.e.*, as the father of the gas industry. A small exhibition of relics has been organized at the Hotel de Soubise by the Archives Nationales.

The Editor also remarks, in the December issue, upon the centenary of the birth of Paul Sabatier whose work on catalysis won him the Nobel Prize of 1912. It is recalled that a nickel catalyst has been used for several years by the cokerie of Toulouse, capital of Languedoc, the country of his birth, in the transformation of natural gas to a gas directly useable in existing domestic appliances.

The 72nd Congress of the Association Technique de l'Industrie du Gaz (the equivalent of the Annual Meeting of our Institution) will be held in Strasbourg in the week June 27 to July 3, 1955. Papers were invited to be submitted before February 1, 1955. The form of the invitation is interesting: 'In order to facilitate the establishment of the programme members of the A.T.G. who intend to present a communication, are begged to advise the Association by an early post.'

Interest in the British gas industry is evident from the detailed and appreciative account of the 20th Autumn Research Meeting of the Institution and from the summary of information taken from the Annual Report of the Gas Council and its publication 'Fuel for the Nation.'

IMPERIAL COLLEGE OF SCIENCE DEVELOPMENTS

The 47th annual report of the Governing Body of the Imperial College of Science and Technology records the granting of licences for the erection of an additional storey over the Goldsmiths Company's extension to the City and Guilds College and the Royal School of Mines building, at a cost of £269,075; the first part of the extension of the Chemical Engineering building, at a cost of £35,717; and the addition of two storeys to the Union building at a cost of £198,883.

The academic plan envisages a much greater rate of increase in the engineering faculty than in the science faculty, and a post-graduate increase of about 160%, against an undergraduate increase of about 44%. It is intended to accelerate a tendency that has for many years shown itself, and to provide eventually for about 1,500 undergraduate students and about 1,500 post-graduates, with perhaps one-half of the latter engaged in research and the other half taking special post-graduate courses. The additional staff that will be required includes Professors, Readers, and Lecturers in new branches of science and technology, as well as additional staff to cope with the increased number of students for existing courses. With the aid of a modest increase in recurrent grant for 1954-55 and the income from the American Counterpart Funds, it is hoped that the University will be enabled to appoint in the near future Professors of Applied Science with special reference to engineering, soil mechanics, statistics, applied geophysics, and heavy electrical engineering.

The new Chair of Heavy electrical engineering and the new Readership in Production Engineering have been financed from sums placed at the disposal of the University, arising from the Government programme for the expenditure of the Counterpart Funds. It is expected that about £8,000 per annum will be available as the result of the investment by the University of the capital sum involved.

The Cement Manufacturers' Association have entered into a covenant for a second period of ten years to pay £2,000 per annum for the continuation of the Chair of Concrete Technology, established as a result of the Association's far-sighted and generous policy ten years ago. At about the same time 12 companies decided to subscribe £200 per annum each towards a fund to provide what are known as the Building and Civil Engineering Contractors' Bursaries, and at present the number of such subscribing companies has risen to the total of 22.

Proposals for expansion on the post-graduate side envisage a large increase in the number of such post-graduate ventures, but the governing body is aware of the importance of providing many more bursaries, whether from public funds or from donations from industry, if the courses already provided, and the new courses contemplated, are to be used by those who can duly benefit from them. Another development which has been given a new lease of life is the Nuffield Research Group in Extraction Metallurgy. During the first five years of its existence this group of research workers was financed by the Nuffield Foundation, though some extension of its work was also made possible as a result of contracts entered into for specific pieces of research on behalf of Government departments, and industrial organizations. Recently the Institution of Mining and Metallurgy has initiated an appeal for funds to ensure the continuation of this group, which has become an important part of the Metallurgy Department, and which now provides training for some nine research students.

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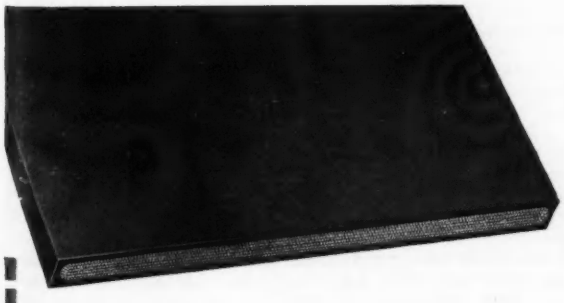

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An Industrial Application of Gas*

By GEORGE MARK-BELL, ASSOC.M.INST.GAS E.,
Distribution Superintendent, Falkirk.

FALKIRK is the heart of the light casting industry, and until recently used cast iron as the basic material. Aluminium, magnesium, and their various alloys have, however, been introduced. This paper deals with some of the gas equipment of a research department attached to a large foundry making castings from these new materials.

With aluminium, magnesium and their alloys, castings can be produced with more accuracy and in finer detail, together with a greater weight-to-strength ratio, than with other materials. This ratio is of first importance in the aircraft, shipbuilding, and electronic industries.

The main installation in the foundry consists of three gas fired furnaces. The first is fitted with an automatic air-gas proportioning device and tunnel combustion burner and is used for the melting of magnesium and its alloys. The second is used for the melting of aluminium and its alloys and is fitted with an air-blast burner. The third is a small portable furnace used for quickly melting small batches of metal for test purposes.

Magnesium requires a certain degree of attention and care if a dangerous explosion is not to result. The furnace consists of a steel cylinder lined with high-grade fireclay bricks backed with insulating bricks next to a steel casing. The crucible protrudes through the steel top covering and the products of combustion are deflected and taken away by a separate flue outlet to prevent contact with the magnesium alloy. The crucible is in a stand and is heated by the air-blast burner, which fires tangentially. The magnesium contains up to 10% aluminium, and when melted is heated to 700°C., spot readings being taken every few seconds with a dip pyrometer as this temperature is reached. The crucible is of steel, and the combustion must be such as to reduce oxidation of the steel. Hence the use of an automatic air-gas proportioning device. Daily inspection of the crucible is carried out to ascertain its thickness and to remove any scale which reduces heat transfer.

During the melting, oxidation of the magnesium is prevented by the use of 'wet' magnesium chloride and potassium chloride fumes which blanket the molten metal. During casting the oxidation is prevented through the use of flowers of sulphur in the sand of the mould or on top of the metal stream during pouring. In die casting the cavity is flushed with SO_2 which is displaced by the molten metal.

The tunnel burner is provided with radiation fins to reduce the temperature of the burner body itself, which is connected to a high-temperature tunnel refractory capable of withstanding up to 3,000°F. In lighting, a gas torch is placed near the tunnel burner and the gas control valve opened fully. The air control valve is then opened until the required pressure is registered on the gauge for the initial heating up. The air valve is then gradually opened in stages until the required working temperature is obtained. The working pressure at the inlet to the burner is then between 4 and 5 in. W.G.

Furnace No. 2 is used for aluminium and its alloys, and melts about 70 lb. of metal at a charge. It consists of a square-shaped steel outer casing lined with specially prepared high-grade firebrick in the form of a cyinder backed with insulating brick. The crucible is fired by an air-blast burner firing tangentially to the pot. In this case the furnace exhausts through a removable cover which allows withdrawal of the metal at the end of the melt; the exhaust port, however, is sufficiently large to allow charging during melting and also inspection of the metal and its treatment.

The crucible consists of clay-bound silica containing plumbago. The plumbago is the actual heat conductor. After a period of use the pot has to be renewed due to loss of graphite. Loss of the graphite during heating effects the efficiency of the furnace, the efficiency decreasing with reduction in the graphite content of the pot.

Types of metal melted in this furnace are: Aluminium—13% silica (L 33); aluminium—4% silica—copper (DTD 424); aluminium—copper (DTD 304); pure aluminium; and aluminium—10% magnesium. The metal is melted and heated to a temperature of 700°C., this temperature being measured by an indicating chromal/alumal thermocouple pyrometer.

The burner has no automatic proportioning device, all the air for combustion being supplied as primary air by the air blast. The gas supply is independent. The gas pressure required is 3 in. to 5 in. W.G., while the air is supplied at a rate of up to 150 cu.ft. per min. at 25 in. W.G.

When putting into operation, the cover is swung off and the drain plug removed; the fan is started up with the air damper fully open to ensure that the furnace chamber is vented. After a minute or so the air damper is closed, a gas torch is inserted and the air damper opened until the pressure gauge needle lies in the "warming" zone. This pressure gauge is of a dial type, the dial being divided into sections according to pressure; its indicating needle is actuated by means of pressure obtained from a tapping on the air manifold between the air damper and the burner.

The gas isolating cock is now opened and the gas control cock slowly opened until the flame from the injector box has a luminous tip. After allowing ten minutes for the flame to stabilize, the crucible is brought up to a temperature of 900°C. gradually by adjusting the air and gas control until the pressure indicator records within the 'melting' zone, which is between 10 in. to 16 in. W.G.

The cover of the furnace and drain brick may be replaced during the warming-up period when the lining of the furnace is showing red. The final flame at the exhaust port should be about 6 in. to 9 in. in height and be a dull yellow in colour. In shutting down the furnace the gas valve is closed before the air supply is shut off.

No. 3 furnace, although the baby of the trio, does Trojan work. It is quick and efficient in melting small batches of metal for test purposes, being capable of melting 10 lb. of aluminium in 10 to 12 min. The furnace can readily be moved about the shop to wherever it is required, the gas connection being a flexible hose, while the air is supplied by a small portable electric blower. The furnace itself is a steel cylindrical shell lined with compressed ganister and backed with insulation brick. The small crucible is fired tangentially by a simple air-blast burner.

The air supply tube which has previously been disconnected, but which is passing air, is now connected to the burner to give the necessary air for combustion and the mixture regulated by means of the gas control valve. To maintain a swirling motion in the furnace a cover with flue aperture is placed over the top.

The cores and moulds used for the foregoing metals are not of the usual oil-bonded sand type. Moulds and cores of cast iron, alloy steel or aluminium are used depending on the nature of the casting required. The conventional oil-bonded sand cores are employed only where an 'undercut' is present in the design and the core must be broken out. For magnesium alloys the sand core should contain sulphur and boric acid (inhibitor).

Normally, conventional crucible furnaces are situated in pits, but the furnaces referred to in this paper can be situated at ground level or in a shallow pit. This reduces installation and maintenance costs. Though the furnaces can be fired by competitive fuels, gas was chosen for its simplicity of working, low cost of installation, cleanliness, reliability, and also speed of melting, which in the case of the small furnace is 50% quicker than with kerosene.

* From a paper to the Scottish Junior Gas Association (Eastern District) Dundee January 8, 1955.

Society of Engineers Award

Miss Marjorie Lovell Burgess, who was awarded a Premium by the Society of Engineers on February 7 for her paper on 'The influence of Murdoch on the Modern World,' shows her award to Mr. E. C. LeJeune, Assistant District Manager, Metropolitan Division, South Eastern Gas Board, Vice-President of the Society.

George Kent Prize Giving

A satisfactory training year was reported at the annual apprentice prize giving of George Kent, Ltd., at Luton, on January 10, by Commander P. W. Kent, R.N. (Retd.), Chairman and Managing Director. The number of apprentices in the firm's scheme is now 132, and a large gathering of distinguished visitors, parents and friends heard Mr. Dorian Williams, Director of Pendley Residential Centre of Adult Education, give in his guest speech a lively warning of the dangers of over-specialization. He thought that we lived in an age of talk, and that more attention should be paid to the need for action.

The main prizes presented by Commander Kent were: Commander Kent Challenge Cup: E. F. Snare (on national service); Sir Walter Kent Prize: D. Thirkell; R. W. Bedford Challenge Cup: J. C. Keeling; Grout Prize: I. R. Jepps. A vote of thanks on behalf of the apprentices was proposed by Apprentice M. E. Ellison, second on the Board of Directors' honours list.

An exhibition depicting the work of apprentices was held in conjunction with the prize giving, and aroused a great deal of interest.

The Aluminium Industry is to present an exhibition from June 1 to 11 next, at the Royal Festival Hall, London, to celebrate the centenary of aluminium as a commercial metal, to show the progress made by aluminium since 1855 and, in particular, to illustrate the research and development, sponsored by the aluminium industry and the Aluminium Development Association, completed during the past ten years.

BROADCAST ON GAS COOKERS

The Midland Region Service of the B.B.C. broadcast on February 8 a series of interviews with four specialists in the gas cooker industry, followed by discussion. Those taking part were employees of the Birmingham production centre of Radiation Ltd. The programme was one in the series 'Just the Job.'

Mr. Vincent Mulroy, a designer, said he had once been a designer of airships, and was still working in gas. His job is the design of cooking appliances. The changing proportions of ovens and hotplates was one aspect touched upon by Mr. Mulroy. Ovens used to be high and narrow but then came the fashion for building the cooker into a line of kitchen cabinets, which had the effect of narrowing the hotplate. The latest designs, said Mr. Mulroy, enabled both oven and hotplate to be of the right size. He also suggested that it might be preferable to separate the two and so place them at a convenient height, though this demanded more space. This he referred to as an 'exploded' kitchen.

Mr. Frank Lake, Cooker Development Manager, explained his responsibility for seeing that new models fit in with the requirements of the industry regarding installation and servicing. Like Mr. Mulroy he is always in search of some striking new development. On the subject of economy, Mr. Lake said that while this was an important consideration it was not given such prominence as would impair efficiency. Certainly a more efficient burner for a hotplate would not be introduced if its performance depended on less efficient combustion. Fuel cost was a comparatively small proportion of the food being cooked.

Miss Mary Bunn, who is also engaged on cookery research, described how she works on recipes with scientific precision, using a stop watch. Even the thickness of the crust on a cake is measured. Last came Mr. Bob Bull, whose job is the actual installation of the cookers—and his first point was that his department comes into the picture long before the cooker is installed. It studies it in the development stages from the points of view of servicing, accessibility, and installation. Cookers are tested in different parts of the country before going into production, for gas quality and cooking habits vary from one district to another. Mr. Bull's department is responsible for writing instruction sheets—which, he said, people very often don't read.

Pictured here are Vincent Mulroy (who now designs cookers instead of airships), Frank Lane (cooker development manager), Mary Bunn (cookery research worker), and Bob Bull (who installs cookers and issues instruction sheets which people seldom read).

Eighty-seven employees of the Power-Gas Corporation, Ltd., and Ashmore Benson Pease & Co., Ltd., Stockton-on-Tees have received presentations of clocks, watches, or silver salvers for long-service with the firms. The recipients included Dr. N. E. Rambush, Managing Director, and Mr. C. Robson, a Director, both of whom have 40 years service.

Duty-free Entry of Machinery

The President of the Board of Trade has appointed a Consultative Committee on the Duty-free Entry of Machinery in accordance with the recommendation by the Wilson Smith Committee. The Committee consists of six industrialists, three with experience mainly as makers of machinery, and three with experience mainly as users of machinery, a trades union representative, and representatives of the Board of Trade and Ministry of Supply. The Chairman is an Under-Secretary of the Board of Trade, and the Board of Trade and the Ministry of Supply will provide Joint Secretaries.

The industrial members are Mr. A. P. H. Atiken, Mr. R. W. Asquith, M.I.P.E., Mr. M. A. H. Bellhouse, M.A., Mr. W. Ellison, Sir Laurence Merriam, M.C., M.A., and Mr. A. York Saville, M.I.MECH. E., and the Trades Union representative is Mr. J. Tanner. The Joint Secretaries are Mr. D. P. Brearley (Board of Trade) and Mr. D. M. J. Gwinnell (Ministry of Supply).

The function of the Committee will be to keep under review the broad policy followed by the administering departments, including the basic criteria laid down for duty-free admission of machinery, and the general rules of administration, to consider problems arising from time to time, and to represent industry's view to the two departments concerned.

The Committee will not be in any sense an appellate tribunal considering appeals on individual applications, and will have no executive responsibilities.

German Visitors Welcomed

A party of 12 Germans representing West Berlin Youth Organizations taking a course, under the auspices of the Foreign Office, studying youth organizations in this country, paid a visit to the North Thames Gas Board's training centre at Watson House. The centre, with its large contingent of apprentices under training, was chosen for this visit as being a first-class example of youth in industry, and the German visitors were impressed with everything they saw, not only the boys' work and their training, but the interest taken in their welfare, and the social amenities provided for them.

Accompanied by Mr. R. N. Bruce (the Board's Staff Controller), Mr. R. N. Le Fevre (Training and Education Officer), and Mr. W. R. Yexley (Juvenile Welfare Officer), the party made a comprehensive tour of the training shops and lecture rooms. Mr. A. D. Graham, M.A., Assistant Director of the City and Guilds of London Institute, was also with the party, and he spoke to them on the set-up of the Institute. After lunch, the party moved on for a tour of the clubrooms, played games with some of the boys, and indulged in an impromptu sing-song round the piano.

Mr. Bruce, during the lunch, made a short speech of welcome, and this was replied to by the leader of the party.

British Industries Fair

Lord Mountbatten is to open the British Industries Fair at Olympia on May 2. It will be the first official opening of the Fair in its 40 years history. It will also be one of Lord Mountbatten's first engagements after taking up his appointment as First Sea Lord on April 19.

This year's Fair is to be the first run wholly as a commercial undertaking. A company, British Industries Fair, Ltd., took over control from the Board of Trade last year and will run the London section at Olympia. The Birmingham section, at Castle Bromwich, continues to be managed by the city's Chamber of Commerce. Sir Ernest Goodale, C.B.E., M.C., Chairman of the new company, flew to the United States last week to step up the campaign to attract American buyers. He said at a New York Press conference, 'We in Britain often undersell ourselves. I am a salesman for British industry—and I know that what we have to offer is among the best in the world.'

Sir Ernest flew on to Toronto to meet Canadian industrialists and newspapermen and give them up-to-the-minute information about this year's B.I.F. The Fair, at which more than 90 industries will be represented, will be held at Olympia and Castle Bromwich from May 2 to 13.

INTERNATIONAL COOKERY DEMONSTRATIONS

During last year, the Cardiff undertaking of the Wales Gas Board decided to run a short series of international cookery demonstrations. These proved to be so successful that it was necessary to give an assurance that a further series would be given this session.

The demonstrations attract many exiles of the various countries featured, and as Cardiff provides a home for many people from other countries, these are invariably extremely well attended. In an effort to ensure that the dishes were prepared in an authentic manner, the Consuls of all the countries to be featured, together with their ladies, were invited to attend an inaugural ceremony at Cardiff. The Consuls were accompanied by the leaders of the various colony organizations and also by the heads of the various religious organizations concerned. The result was a most colourful occasion which did a great deal to ensure that each demonstration would have the full support of the local colony.

Our photograph shows M. Henri Langlais, the French Consul at Cardiff, expressing appreciation on behalf of the 12 other Consuls who attended a most unusual but friendly gathering.

Diary

Feb. 17. EASTERN SECTION I.G.E.: 'Technical Problems in the Utilization of Town Gas in Industry,' F. Dickerson and F. Johnson: 17, Grosvenor Crescent, S.W.1, 2.15 p.m.

Feb. 17. WALES AND MON. JUNIORS (SOUTH): Visit to Refrigeration Factory. 'Planning for Thermal Efficiency,' K. H. Langford.

Feb. 17 and 24.—MIDLAND JUNIORS. Visit to Audley Engineering Co., Ltd., Newport, Salop.

Feb. 18.—MIDLAND SECTION, I.G.E.: 'The West Midlands Approach to the Gasification of Residual Oil' (I.G.E., Comm. 456), G. le B. Diamond. Queen's Hotel, Birmingham, 2.30 p.m.

Feb. 18.—MANCHESTER SECTION, I.G.E., and NORTH WESTERN SECTION, INSTITUTE OF FUEL: Joint meeting on 'Sulphur Removal and Recovery,' Engineers' Club, Albert Square, Manchester, 2.15 p.m.

Feb. 21. EASTERN G.C.C.: Connaught Rooms, Great Queen Street, Kingsway, W.C.2. 2 p.m.

Feb. 23. WESTERN JUNIORS: Visit to works and stores of Metal Agencies Co., Ltd., Bristol.

Feb. 24.—NORTH OF ENGLAND SECTION, I.G.E.: 'The First Years in the Life of a New I.V.C. Installation,' H. Waiton. Demonstration Theatre, Grainger Street, Newcastle-upon-Tyne.

March 1.—EAST MIDLANDS G.C.C.: Victoria Station Hotel, Nottingham. 11.30 a.m.

March 1.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster. 11 a.m.

March 2.—SOUTHERN G.C.C.: Reading.

March 2.—SOUTH WESTERN G.C.C.: 34, Bridge Street, Taunton, 11 a.m.

March 4.—LONDON JUNIORS: Short Paper Night. 'Bog Ore,' H. C. Walker; 'A Cubic Mile,' J. C. Salmon; 'Was Mrs. Beeton Right?', Miss J. Houghton. 178, Edgware Road, London, W.2. 6.30 p.m.

March 5.—MANCHESTER JUNIORS: Visit to Partington works.

March 5.—SCOTTISH JUNIORS: JOINT MEETING OF WESTERN AND EASTERN DISTRICTS: Address by H. F. H. Jones, M.B.E., Deputy Chairman, Gas Council. Glasgow, 3 p.m.

March 7. — NORTHERN G.C.C.: Gas Board Offices, 30, Grainger Street, Newcastle, 11.15 a.m.

March 8.—MIDLAND JUNIORS: 'Gas Quality Measurement,' H. Mellors. Birmingham.

March 8.—SCOTTISH JUNIORS (EASTERN): Jubilee Dinner. Adam Suite, George Hotel, Edinburgh.

March 9.—SOUTH WESTERN SECTION, I.G.E.: General Meeting. Tour of Swindon works of British Railways, preceded by talk on the building of locomotives.

Fife Employees Honoured

Two members of the staff of Cowdenbeath District of the Scottish Gas Board were honoured by their fellow workers at a social evening on January 26. Mr. Robert Air, who was relinquishing his duties after 21 years as distribution foreman and 50 years service in the gas industry, was presented with a wallet of Treasury notes. Mr. Robert J. A. Bennett, Assistant Manager at the works for the last six years, was presented with a brief case on his departure to take up an appointment with the National Industrial Fuel Efficiency Service at Manchester. The gifts were handed over by Mr. W. T. Gilchrist, district manager.

Mr. Air was also honoured by the British Gas Staff Association, who presented him with a set of pens handed over by Mr J. McConville, Area Secretary. Mrs. Bennett received a box of chocolates.

Mr. D. L. Dickson, Manager, Fife Group, presented Mr. J. Black, a fitter employed by Cowdenbeath District, with a certificate he had gained in the City and Guilds of London examination in Gas Fitting.

Gas in the Ideal Home

Making its first appearance at the Ideal Home Exhibition at Olympia (March 1 to 26) is Thomas de la Rue & Co., Ltd.'s new 'Potterton' domestic gas-fired boiler for hot water supply, or for central heating up to 280 sq. ft. of radiator surface. Also on view will be their new 'Warwick' cooker with the extra wide oven, eye-level grill, warming drawer and built-in four-hour timer. Five models will be shown in a range of modern colour schemes.

The Parkinson Stove Co., Ltd., has also been experimenting with colour and will present the Renown Five gas cooker in a selection of colour fittings. Parkinsons will also feature their new 'Live Water' washing machine which is of a revolutionary design. The unique action of 'Live Water' agitation is created by jets of water which produce a rotary motion in the tub, whereby clothes tumble in every direction, while the water swirls through the fibres, removing all traces of dirt. The machine will wash 5 lb. of dry clothes in five minutes and will take double blankets. The water is heated by gas, and the clothes are boiled.

Radiation Group Sales, Ltd., will show a comprehensive range of New World cookers, all of which are fitted with Regulo oven heat control. Also on view will be the new convector gas fire.

General Gas Appliances, Ltd., will exhibit two items: the Crusader cooker and the Junior cooker.

Other manufacturers who with those just mentioned will form a complete Gas Section round the Gas Council's Gas Pavilion, will be: Ascot Gas Water Heaters, Ltd., Bratt Colbran, Ltd., Cannon (G. A.), Ltd., Ewart & Son, Ltd., Ltd., Stoves, Ltd., and Vulcan Stove Co., Sidney Flavel & Co., Ltd., R. & A. Main, Ltd.

WESTERN JUNIORS VISIT EXETER

Members of the Western Junior Gas Association visited the Basin Works of the South Western Gas Board at Exeter on January 22. In October, 1953, during a previous visit, members had seen the beginning of the reconstruction of this works, and had spent some time watching pile driving and other foundation work in progress. Now they were able to see the large retort house by the Woodall-Duckham Construction Co., Ltd., built on those piles, planned initially to produce 6 mill. cu.ft. per day and ultimately 9 mill. cu.ft. per day.

Climbing to the top of this building with its steel work surmounted with a large jib crane, they were able to look down on the rest of the works, with the new coke handling and screening plant on piles forming another massive structure. Some of the other new ancillary plant has not yet been erected, but most of the foundation work is in hand, and new rail sidings have to be laid.

Much work was in progress, and many members stopped to watch retort setters at work, intrigued by the apparent ease with which each brick was laid in position to form the clean line of the walls of the vertical chambers.

At the conclusion of the visit members reassembled at the Demonstration Theatre, Southernhay East, to hear a paper on 'Industrial Development in Rural Areas.' The Author, Mr. E. I. Luscombe, Industrial Engineer, Taunton, presented an interesting paper on the growth of industrial uses of gas in an area predominantly rural, instancing several unusual applications of gas.

Mr. J. W. Denton, Divisional Engineer and Manager, in opening the discussion, said he considered the paper to be important because one of its aspects had shown that integration mains had made gas available to many small places previously isolated, providing opportunities for distribution personnel and others to introduce gas to new potential consumers, both industrial and commercial.

Mr. J. Bowler (Bath), in proposing a vote of thanks to the Author for a very excellent paper, said the paper reflected great enthusiasm for the job, and suggested that Mr. Luscombe liked his job.

The President, Mr. F. G. Craxford, announced that the following new members had been elected: Stanley Armitage (Parkinson & Cowan), J. A. Taylor (District Superintendent, Bristol), S. H. Bale (General Consumer Service Superintendent — Weston-super-Mare), and C. H. Gilbert (District Manager—Exeter).

JERSEY GAS COOKERY DEMONSTRATIONS

No fewer than 504 entries were received for the Dundee cake-baking competition which was a feature of a successful series of gas cookery demonstrations organized by the Jersey Gas Light Company, in collaboration with R. & A. Main, Ltd. 'We expected something in the region of 150 entries, but this has exceeded our wildest dreams,' said Mr. S. P. Pepin, Managing Director of the Company, when announcing the competition result.

Miss Helen Main judging some of the 504 entries in the cake baking competition organized by the Jersey Gas Light Company in collaboration with R. & A. Main, Ltd.

The cakes were judged by Miss Helen Main, Chief Demonstrator, R. & A. Main, Ltd., who during the week had carried out the series of afternoon and evening demonstrations in the demonstration theatre at the Gas Company's St. Helier showrooms. On the final night of the competition over 300 housewives attended, and loud speakers were installed in the showrooms to enable those unable to get into the theatre to follow the proceedings.

The first prize was a Main No. 20 'Century' cooker. Other prizes included a Main No. 109 'Economain' cooker, a Thermain No. 2 storage water heater, and portable gas fires. Ten consolation prizes of gas pistol-lighters were also awarded. All these appliances had been featured in a window display during the period of the competition, and later the winning entries were also displayed.

After announcing the winners, Mr. Pepin presented Miss Main with a silver Jersey milk-can in appreciation of her hard work and to remind her of her visit to the Island. With it went the best wishes of the Gas Company and all who had entered the competition.

Miss Main, replying, paid tribute to Mr. du Feu, Showroom Manager, and his staff for the efficient manner in which they had arranged both the demonstrations and the competition, which had, she said, made it possible for her to deal with the large numbers involved without undue handicap.

MINING ENGINEERING—A GREAT PROFESSION

Speaking at the annual meeting of the Institution of Mining Engineers on January 27, as the recipient of this year's Medal of the Institution, Sir Andrew Brown recalled that in 1917, when France was at one of her earlier cross-roads, her Prime Minister, Clemenceau, said: 'War is much too serious for soldiers!' There was today, he believed, a real sense in which the business of getting coal was far too serious to be left to mining engineers—if they were going to seek the answers *solely* in terms of their professional technologies. There was a real sense in which they had to give themselves a new look, not by thinking up new methods or formulae—important as these were—but by making their existing skills go much further by applying their knowledge and resources through different and more effective fulcrums, and by making more use of subordinates.

Highly-qualified mining engineers, possessing all the skills of a manager, were spending too much of their time going round the pits today attending to jobs that should have been done by junior officials. They were undertaking, as a profession and without much objection on their part, the performance of tasks that were, at a time when the industry was short of thinking power, well below their technical competence. As a profession they had always tended to place too narrow an interpretation on what they meant when they called themselves 'practical men'; they had a delicate appetite for digesting new ideas; and figures, or statistics, too often came in for their contempt. Too often they finished discussion of their difficulties and problems, and what should be their general plans, by saying, in a marked change of voice: 'Now come on, let's get down the pit and get some coal!'

In coal mining, there had been great changes in their lifetime, and especially during the past seven years. They had one Board responsible for the whole industry; they had pits getting bigger and bigger and more highly mechanized; they were now getting coal at the face with teams of 100 men instead of two men and a boy; they negotiated with a vast union rather than with individuals; and they relied more and more on mechanical, electrical, and civil engineers. A coal mine today was no longer a one-man business. From all this, and much more that he had not time to speak of, it followed inevitably that as mining engineers they could no longer hope to deal with difficulties personally at the points where they arose, except rarely on occasions of great difficulty or emergency.

No one had a greater admiration than he had for the enormous range of activity covered by the manager of a large modern colliery, nor more humility when he asked how he would shape in his shoes. But their jobs were not to train themselves as memory men; they must have under their hands a proper organization for the 100 or more subordinates through whom they worked. It was their first job to see that their subordinates were enabling the men to get the coal with the least effort. This deployment of their skilled resources was an art that had little to do with the physical techniques of mining. It was something additional and of a totally different nature. During the war, when they became desperately short of timber they appointed throughout the industry a number of persons called Supports Economy Officers. He suggested that what they needed now were Management Economy Officers to conserve what had become their most precious asset—the skill of their mining engineers. It was their duty to themselves, and to the industry, to pause, not occasionally but frequently in the course of their working days, and to ask themselves: 'Is what I am doing really the kind of thing that I ought to be doing or could it be done by someone on my staff while I attend to the jobs that only I can do? And if there is nobody on my staff who can do it, ought I not to get somebody pretty soon who can?'

In all this they should remember that no one would fashion his junior officials into good men and a good team unless, by degrees, he not only gave and trusted them with their full responsibilities but also insisted on their taking and discharging those responsibilities. The industry had passed from the days of abundance—abundant coal, abundant miners, and abundant mining engineers. The smallness of the pool of mining engineering ability was one of their major problems today. Many years would pass before this was put right by recruitment, education, training, and experience. Meanwhile the best use must be made of existing talent. Only in that way could they hope to do their job efficiently. Only in that way would they be worthy of their great profession.

Coleraine Output

At a meeting of Coleraine (Co. Londonderry) Borough Council Gas Committee it was reported that from December 1, 1954, to December 29, 1954, the amount of gas manufactured was 15,096,500 cu.ft., an increase of 249,000 cu.ft. compared with the corresponding period in 1953. The stock of coal during the week previous to December 29 was reduced to a few days supply, but a further cargo unloaded on December 29 relieved the situation.

During the period of the coal shortage, inferior quality coal—which had been purchased as boiler fuel—had to be used for gas manufacture, and this coal in conjunction with an inferior quality of English coal, had resulted in a high sulphur content in the gas which the purifiers had been unable completely to eliminate. It had been necessary to order special purifying materials, and it was hoped that with these and the new Scottish coal the quality would be restored to normal.

The Manager (Mr. W. R. Armstrong) stated that the gas was now clean.

Foxboro-Yoxall Training School

The Foxboro-Yoxall training school was opened three years ago to give a series of comprehensive two-week courses for instrument maintenance engineers whose firms are users of Foxboro instruments. The courses were designed to give a general coverage of the principles of measurement and control, and that they filled a want is evidenced by the fact that applications for the courses far exceeded capacity.

It has been decided that in 1955 the courses will be divided into two series. Course 'A' mainly practical and Course 'B' mainly theory and application. The courses, held in the training school at the Company's Trinity Road works, are available without charge to users of Foxboro instruments. Early application for places should be addressed to the Chief Instructor, Foxboro-Yoxall Training School, Lombard Road, Merton, who will be pleased to supply full details.

Dates of courses to be held in the first part of the year are: Course 'A,' January 31-February 11; course 'B,' February 28-March 11; course 'A,' March 28-April 8; course 'B,' April 18-29.

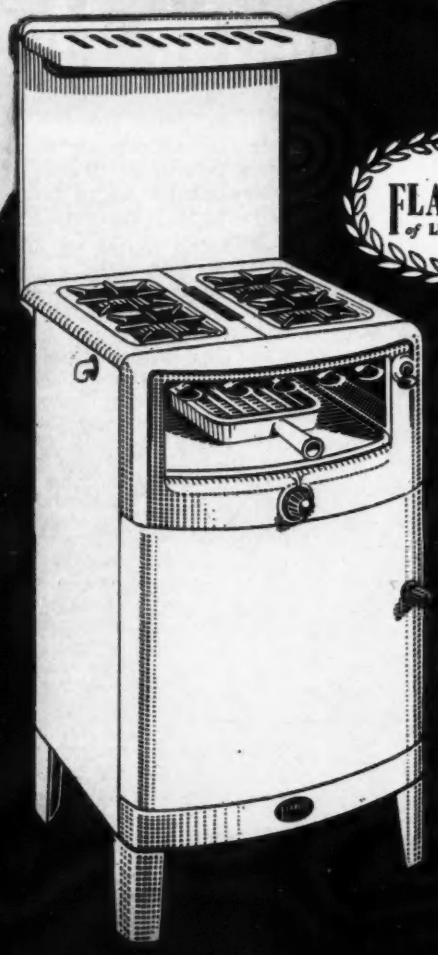
Scarborough Gas Lamps

Scarborough Hotels and Boarding Houses Association, which has said it is prepared to accept an increase in rates provided the money is used for the development of the town's natural assets, has told the Water and Streets Committee that it has noted that considerable expenditure is now proposed for the conversion of lighting from gas to electricity and has intimated that members on the north side of the town were particularly anxious that the old type of gas lamps on the Marine Drive should now be replaced by something more modern.

The Water and Streets Committee, though not recommending any modernization or conversion scheme for the Marine Drive lighting, is to suggest that the North Eastern Gas Board be asked to replace the old fashioned bowls on the Marine Drive lamps by modern ones wherever possible.

Sometime ago the committee submitted a scheme for converting the Marine Drive lighting to electricity, but it entailed laying a cable and building a sub-station at a cost of about £12,000, and the Finance Committee turned down the plan because of its high cost. A similar conversion scheme would cost even more today.

The Corporation Committee which is at present carrying out in stages a plan to convert the town's lighting from gas to electricity is concentrating on getting rid of the large 12-mantle gas lamps, which are the most uneconomical, in areas where electricity cables are already available. The gas lamps on the Marine Drive are not of the 12-mantle type and, in any case, the committee points out, they are less uneconomical than gas lamps in other parts of the town because they are not in use during the winter months.



FLAVELS of LEAMINGTON

The Pride of the kitchen . . .

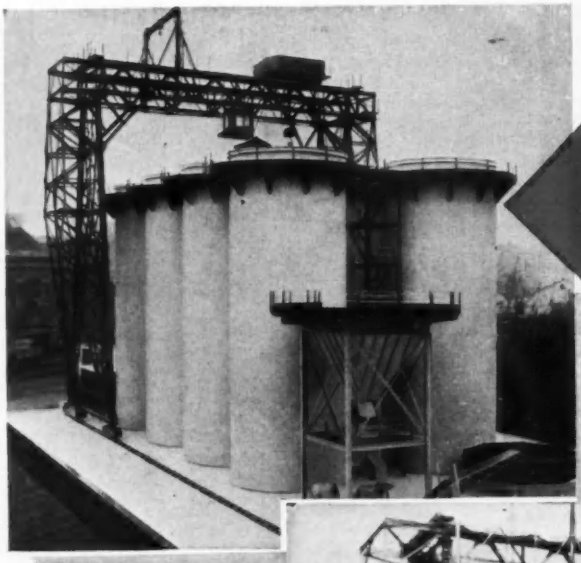
The Housewife of today wants a cooker that is both attractive and efficient for a modest price

Here is the cooker that meets all these requirements

THE FLAVEL 68

FLAVELS OF LEAMINGTON — MAKERS OF FINE COOKING AND HEATING APPLIANCES SINCE 1777

Tower Purifiers



from the Model...

These Tower Purifiers recently completed at Dover have a capacity of 10 mill. cu. ft. per day with provision for future extensions as shewn in the model. We should be happy to consult with you on any Gas Purification requirements you may have.

...to the

Finished Plant

(Photograph by courtesy of South Eastern Gas Board, Dover.)

NEWTON CHAMBERS

& CO. LTD., THORNCLIFFE, Nr. SHEFFIELD

GAS CONSULTATIVE COUNCILS

Threatening Clouds of Increased Costs

Dr. R. S. Edwards, Chairman of the North Eastern Gas Board, speaking at a meeting of the North Eastern Gas Consultative Council in Leeds on January 31, said that gas boards throughout the country were disturbed by the persistent decrease in the consumption of gas per domestic consumer over the past three or four years. Dr. Edwards said the very substantial increases in industrial and commercial use of gas had been outweighed in the North Eastern area by this drop in sales per domestic customer.

There were, he said, reasons to explain the decrease, and among them was the fact that new gas cookers which were replacing the old and less efficient ones were estimated to consume 15 therms a year less than the older type of cooker. The installation of nearly 250,000 new gas cookers had meant a tremendous saving in gas to householders with a corresponding loss to the Board.

Changing Habits

There were also changes in consumer habits, and great developments in works and school canteen feeding. The Board was trying to check the fall by wider advertising, extension of hire purchase terms, and by encouraging gas consumption for other uses, and there were signs of a halt in the downward trend.

Dr. Edwards mentioned that the price of gas had not been increased in the area for nearly two years, and he hoped that there would again be a surplus at the end of the present year on March 31. 'But,' he said, 'there are threatening clouds of increasing costs. We believe in keeping the price of gas as low as possible and we will try to minimize the effect of these increases.'

Concern at the downward trend in the consumption of gas per consumer had been expressed by one or two speakers in discussing the annual report of the North Eastern Gas Board. County Alderman H. Sutcliffe, Leeds, had said the Board's small surplus for the year end had been achieved only by a 10% increase in the price, and not through increased sales.

Mr. W. H. Laycock, Mirfield, had said it seemed rather strange that the demand should fall when industry was riding on the crest of the wave. Surely, he said, there must be something wrong and it must give the Board some serious thought.

Disparities in Tariffs

Alderman J. H. Whitaker, Todmorden, while congratulating the Board on keeping the price of gas down, deplored the disparities in tariffs. He said it was wrong that industry and street lighting should be subsidized. It was his opinion that the domestic consumer was being overcharged and was subsidizing commercial consumers. At Todmorden there had been an increase of 85% since nationalisation whereas the cost of production to the Board had gone up by only 41.3%.

Alderman Whitaker went on to criticize the loss of £236,000 in the last three years on the sale and hire of appliances. Selling expenses were 6s. 2¼d. in the £ and the Board had lost practically 1s. on every £ of sales. He asked the Board: 'Don't you think 33⅓% is enough cost on sales?'

Councillor G. W. Clough, Ilkley, complained that gas meter reading and the collection of accounts was costing about 10s. per customer. For 1953-54 the cost of meter reading and collection was £436,131 for 852,936 consumers. The accounts of the Yorkshire Electricity Board also showed an average cost of 10s. 5d. for every consumer for the same service. He asked if it was not possible for gas and electricity boards to get together to establish a joint meter reading and account collection system.

Dr. Edwards, replying to Alderman Whitaker, said the loss on sales was really a question of accountancy. Overheads were worked out on a system operated by other area boards, and charges compared favourably with those of private traders. The Board's costs were no higher than most of the other boards and in the matter of hire purchase and sale of appliances 33⅓% on cost was rather less than the mark-up of the hardware trade generally.

On the matter of joint meter reading and collection of accounts between the gas and electricity boards, Dr. Edwards said that an impartial investigation was being made nationally, and it would be better to await the results of this enquiry before attempting to take any steps on an area basis. Meter reading and collection of accounts was constantly receiving the Board's attention and where possible machinery was being introduced for the sake of economy.

Dr. Edwards thanked the members of the Consultative Council for their congratulations on the annual report and results for the year, and said that in the last five years 20% of increased costs had been offset by greater efficiency.

Cheaper Gas in North Cheshire

Reduced gas prices became operative in certain districts in the North Cheshire Group of North Western Gas Board, after the first meter reading following February 8. This was reported to the North Western Gas Consultative Council meeting at Manchester on February 3.

As a result of the recent amalgamation of the North Cheshire and Peak Groups there had been four different scales of prices operating in the North Cheshire Group, as follows:—Original North Cheshire Group (Macclesfield and Bollington only), 18.75d. per therm; remaining districts in the original North Cheshire Group, 19.25d.; former Peak Group (Buxton only), 20.25d.; remaining districts of former Peak Group (New Mills, Hayfield and Chapel Whaley), 22.25d.

Appreciable savings have resulted from the amalgamation due to reduction of staff, administrative economies and the integration of the New Mills, Hayfield and Chapel Whaley districts into a single unit for consumer service. The North Western Board now passes on the benefits of these savings by reducing the price of gas to consumers in the New Mills, Hayfield, and Chapel Whaley districts to the Buxton price—*i.e.*, by 2d. per therm. On the basis of present sales, this will mean a reduction in the Board's revenue of approximately £7,650 per annum. This price reduction is not connected in any way with the bulk supply of gas to these areas which has been in operation for more than two years.

Answering questions about the price of coke, Alderman C. E. P. Stott, who presided, said he had no hesitation in saying that if instead of there being one producer (the North Western Gas Board), there were the 103 that existed before vesting day, the price of both coke and gas would be higher than they were today. If people wanted cheaper coke, then gas would have to be dearer; if cheaper gas was wanted then coke would have to go up. If the quality of coke was comparable with coal, no injustice arose if the price charged was the same. It took two tons of coal to make one ton of coke. The price of coal used in the gas industry had gone up by 400%, the price of gas made and sold from coal, 100%, and the price of coke by 375%. Coke had not gone up by as much as the price of the material from which it was made.

The Chairman stated he had asked the Gas Board to state at what sales point the price of gas balanced the cost. The reply indicated that a credit consumer using 39 therms of gas in a year just about paid, through the price of gas and metering charge, for the capital charges on the meter—cost of reading, billing and collection, together with the cost of the gas. In the case of a prepayment consumer, the figure rises to round about 48 therms per annum. These figures related to consumers serviced by assets (other than the meter itself) of which the cost to the Board was the average cost of inherited and post-vesting assets. Where a new service was required to, say, a new house, then the capital charges would be much higher for that particular occupier.

The only other subject of importance at this meeting concerned the suggested insurance of money in prepayment meters. The Board has been asked to supply certain information on this. Alderman Stott submitted a statement in

which he explained that he had approached certain insurance companies to ascertain the attitude towards extending the scope of householders comprehensive insurance to cover cases of genuine robbery. Although this type of cover was outside the scope of policies, some companies occasionally made ex gratia payments. One insurance office, however, defined the present cover granted by its policy as follows:

(a) Damage to meter: We pay for necessary repairs to meters following damage by actual or attempted theft of money, provided only that our policy holder is legally liable for making good such damages. We are not concerned with whether the meter is inside or outside the house. We should not pay if the damage was caused by our policyholder or a member of his household.

(b) Theft of money: Our householders' comprehensive policies cover money for which the insured is responsible (up to a maximum of 5% of the sum insured on contents, with an overriding limit of £25) against loss by burglary and housebreaking . . . our policies do not cover larceny. After discussion, this insurance office agreed to the following extension of cover without charging an additional premium:—'If the holder of a current householders' comprehensive policy covering an adequate sum on the contents of a private dwelling house is legally liable to make good money stolen from a gas pre-payment meter and if evidence satisfactory to the Society is produced that there was a theft by a person other than the policyholder or a member of his household, then the Society will make a payment of such amount as it deems reasonable, which will normally be the amount certified by the regional gas board as having been stolen. Any such payment will be additional to the sum for which we are liable under the terms of the policy.'

That Bowl of Water

There was only a light agenda at the monthly meeting of the North Thames Gas Consultative Council, held at Gas Industry House on January 27, under the Chairmanship of Councillor Edwin Bayliss, so timed as to allow the members an opportunity of visiting the new miniature cinema to see two new North Thames Films—'North of the Thames' and 'An Omelette'—and the new Gas Council film 'Guilty Chimneys.'

Once upon a time someone conceived the idea that a bowl of water should be placed in front of a gas fire in the interests of health. The minutes of the Metropolitan District Committee recorded that a chartered mechanical engineer had written asking for the Council's view on the practice. He had been informed that as the Council had no technical staff his request had been passed to the Board, which would arrange for a technical expert to explain.

Mr. W. Elliott, Secretary of the Council, presented the Board's explanation. The reply in brief was that while there could be no harm in it, the bowl of water was quite unnecessary. For many years the Board's technical staff had studied every aspect of radiation, and from the point of view of the bowl of water there was no difference between a properly installed gas fire and a solid fuel fire.

Another matter mentioned by the same Committee was a complaint by a Highgate consumer that he had been asked to pay £5 more for a cooker in cream finish than for an almost identical appliance in white. It transpired that the Chairman had in his younger days been engaged in the enamelling industry, and that another member of the Council was at present on the board of an enamelling enterprise, and neither of them could say exactly why it was that the Board wanted to charge so much more for the cream finish. An informal talk ensued in which the lady members expressed their personal preferences, and although no vote was taken, it seemed that the whites had it. The Highgate consumer had contended that the two cookers should be sold at the same price, but as he could not wait for a cream cooker to be specially ordered he had accepted a white one.

The Middlesex and Surrey District Committee again brought up the question of privacy in showrooms. A member had asked for cubicles to be provided at the Kilburn showrooms where consumers could discuss their business with the Board's staff in greater privacy than at present.

It was agreed that quite a lot could be done by the simple expedient of rearranging some of the furniture, and the Council's views on this matter were forwarded to the Board.

Arising out of the report of the Berks and Bucks District Committee mention was made of the almost entire disappearance of old-fashioned rubber connections for flexible tubing. It was explained that it had been the practice of the Board for years to substitute a more permanent type of connection in the interests of consumer safety. Facilities now exist for consumers to have all such connections changed to fittings of modern design, but it was pointed out that people could still purchase unsafe rubber connections from local ironmongers for a few pence—a form of dangerous freedom that might lead to fatalities.

It was announced that Dr. G. E. Foxwell, a member of the Beaver Committee, had accepted the Council's invitation to attend the next meeting, at Westminster City Hall, on February 24, to discuss with members the main points of the Committee's Report. It was also hoped to secure the attendance of Mr. G. Nabarro, M.P., Parliamentary duties permitting.

Outstandingly Good Sales

Mr. T. W. Jackson, Engineer and Manager of the Weston-super-Mare and Taunton Division of the South Western Gas Board, told the Divisional Committee of the Gas Consultative Council at a meeting at Bridgwater on January 26 that sales in the area were outstandingly good, especially of water heaters. The Board was trying to foster the use of gas for catering, and an exhibition was to be held at Weston-super-Mare in March. Coke sales had improved; a retail bag round in all the districts was in operation, and 90% of this was new business, especially in the Council houses where coke grates were in use. There had been no difficulties during the last cold spell in supplying coke, and there had been no occasion to reduce gas pressures.

On integration, the Martock, Langport, and Somerton link had been held up by floods, but it would be completed by the end of February. The supply of gas in these three places would not be affected until a supply could come from Bath. That would mean laying another 14 miles or more of 12 in. main. A 12 in. main was now being laid between Shepton Mallet and Midsomer Norton. The next section would continue it down the Fosse Way to Ilchester. It would branch off to Martock and to Yeovil and connect existing distribution systems, thereby linking up with Crewkerne, Chard, and Ilminster.

This project was being speeded up by the delivery of pipes which was better than had been anticipated, and it was hoped to have a supply of gas from Bath to some of these undertakings by the end of November of this year. The whole programme should now be finished before 1957.

The Manufacturers of 'Saflex' plug-in cocks, Wm. Whitehouse & Co., Ltd., have just had granted to them for a further period of 10 years the patent right for the manufacture of the fitting.

Higher Renewal Fees are to be charged for patents and designs registrations due to expire after April 30, 1955; and after that date there will be a general increase in fees payable in respect of a number of patents and designs matters. These fees have remained substantially unchanged for many years despite considerable increases in administrative costs. The change is announced by the Board of Trade which has laid before Parliament revised rules which amend those made under the Patents Act, 1949, and the Registered Designs Act, 1949. In addition to providing for higher fees, the Patents Rules have also been amended in minor respects to make them conform to the requirements of the European Convention of December 11, 1953, relating to the formalities required for patent applications.

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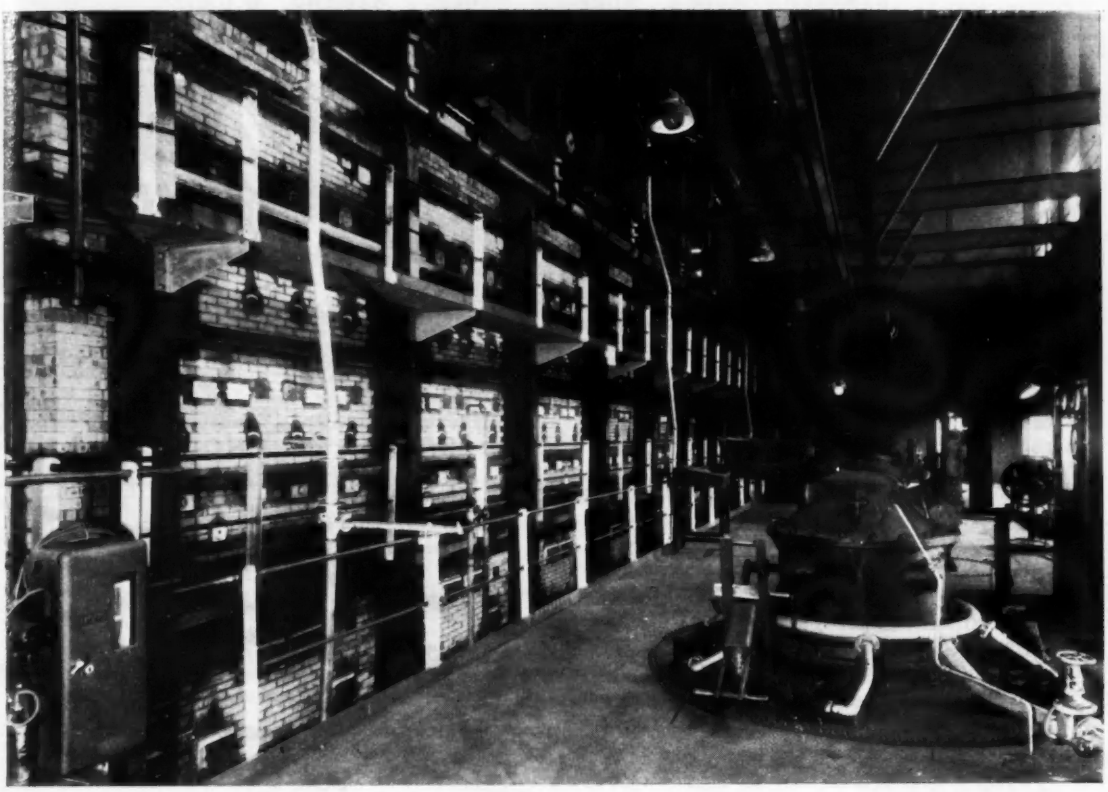

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View showing top of Mechanical Producer Charging Platform and setting controls with platforming.

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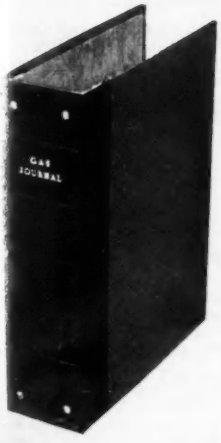

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APPLICATIONS are invited for the above position at a salary within Grade A.P.T. 7 (Provincial 'A') (£585-£665 per annum) of the Salary Scales agreed by the National Joint Council for Gas Staffs.

Applicants should have experience in industrial and commercial gas utilisation and a knowledge of the comparative costs and merits of other fuels. Technical qualifications would be an advantage.

The successful applicant will be required to pass a medical examination and to participate in the Board's Staff Pension Scheme.

Applications, giving full details of training, experience and qualifications, should be sent to the Group General Manager, North Eastern Gas Board, Wakefield Group, Warrengate, Wakefield, by Saturday, February 26, 1955.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds. 2.

EASTERN GAS BOARD

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VACANCY FOR
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APPLICATIONS are invited for the position of CARBONISING FOREMAN at the Luton Gas Works. Applicants, preferably under forty years of age, should have experience in the control, operation and maintenance of horizontal and continuous vertical retorts.

The salary offered is within the range of Grade A.P.T. 5 (£520-£600), Metropolitan Fringe grading, with placing according to qualifications and experience, and all conditions of service are in accordance with agreements of the National and Area Joint Councils for Gas Staffs. A house will be available at a reasonable rental for the successful applicant.

The person appointed may be required to pass a Medical Examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications giving personal details and particulars of training and experience should be forwarded to the Works Engineer, Eastern Gas Board (Watford Division), Gas Works, Dunstable Road, Luton, Beds., not later than February 26, 1955.

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The salary will be appropriate to experience and qualifications, and candidates are invited to state their expectations. Subject to satisfactory performance of duties, the position will be permanent and pensionable. A house free of rent and rates will be provided and reasonable household removal expenses will also be paid.

Applications stating age, experience, training and professional qualifications together with the names of two referees should be received by the undersigned not later than March 15, 1955.

N. J. ROBERTSON,
General Manager.

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The salary offered for the appointment is in accordance with Grade A.P.T. 8A (£625-£705 per annum) of the National Salary Scale for Gas Staffs.

The successful candidate will be required to pass a medical examination and to contribute to the Board's Superannuation Scheme.

Applications, stating age, qualifications, and experience together with details of present and previous appointments, and the names of two referees, should be received by the undersigned not later than February 28, 1955.

C. B. MAWER,
Secretary.

Wales Gas Board,
2, Windsor Place,
Cardiff.

SCOTTISH GAS BOARD

SOUTH EAST DIVISION
FALKIRK DISTRICT
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Applicants should possess the Higher Grade Certificate (Supply) of The Institution of Gas Engineers, or an equivalent qualification. They must be experienced in all branches of gas utilisation and transmission at both low and high pressures. Sound training and experience in the planning, estimating and supervision of distribution systems is essential.

The salary will be within Grade A.P.T. 9, Provincial 'A', £655-£755 per annum. with placing according to qualifications and experience.

The post is superannuable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience together with the names of two referees, should be addressed to the undersigned on or before Monday, February 28, 1955.

WILLIAM EWING,
District Manager.

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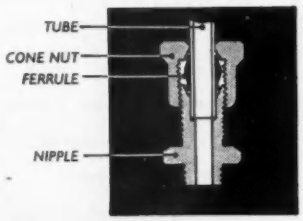

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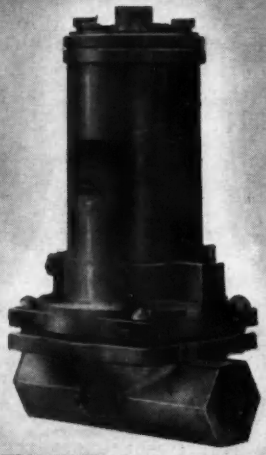

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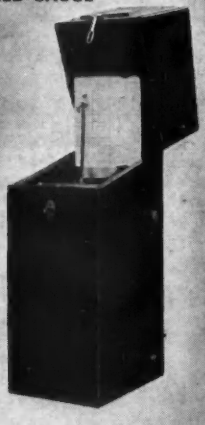

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